

# ***Waxy Crude Processing Project***

## ***Notice of Intent for an Approval Order***

***Prepared for  
Tesoro Refining and Marketing Company  
Salt Lake City Refinery***

***December 2011***



# **TESORO**



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## 1.0 Introduction

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This Notice of Intent (NOI) package is submitted for approval of the Waxy Crude Processing Project (Project) at the Tesoro Refining and Marketing Company's (Tesoro's) Salt Lake City (SLC) Refinery. This NOI package replaces the previous version submitted on September 19, 2011, as the "Black Wax Processing Project." The SLC Refinery currently operates under multiple Approval Orders (AOs), of which DAQE-AN0103350051-11 for the major process units and DAQE-AN103350055-11 for the transport loading rack and northwest tank farm are affected by this Project.<sup>1</sup> The SLC Refinery is situated on 236 acres in Salt Lake County, approximately 1.5 miles north of downtown Salt Lake City.

The Waxy Crude Processing Project is expected to benefit the state of Utah in several ways. The additional waxy crude that will be processed is produced directly in the state of Utah. This is expected to create additional Utah jobs in order to produce and transport this local crude oil to the refinery. The project will also strengthen the Tesoro Salt Lake City Refinery. Tesoro directly employs approximately 250 employees at the refinery and additional jobs are expected to be created and supported by the continuing operation of the facility. The refinery is a significant source of tax revenue for the state of Utah and Salt Lake City. A large percentage of the goods and services needed to complete this project will be procured from within the state of Utah and additional construction jobs are expected to be created as a result of this project. In addition to the economic benefits for the Salt Lake City area and state of Utah, the project will result in reduced emissions of sulfur dioxide from the refinery.

The Project involves changes to the following process areas of the refinery:

1. Waxy Crude Receiving and Processing
2. Fluidized Catalytic Cracking Unit (FCCU)
3. Alkylation Unit (Alky)
4. LPG Loading Facilities
5. Distillate Desulfurization Unit (DDU)

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<sup>1</sup> As of 4/27/11, the transport loading rack and northwest tank farm are owned and operated by Tesoro Logistics Operations, LLC under AO #AN103350055-11. These emission units are considered to be part of the same stationary source as the refinery for the purposes of NSR applicability.

The Project will add Black and Yellow Wax crude unloading facilities, including a replacement Tank 188 for storage of Black Wax crude and adding an additional tank for Yellow Wax crude. To improve processing of the waxy crudes, the Crude Unit will be modified with upgrades to the desalter, heat exchange system, and pumps. At the FCCU, the changes will improve product yields and increase production of light products due to additional residence time in the FCCU riser, new wet gas compressor, new absorber/stripper and debutanizer columns, tower internals, pumps and exchangers at the Vapor Recovery Unit (VRU). The changes at the Alky will include several upgraded exchangers and pumps, and an upgraded compressor turbine for increased rate and DIB feed treating vessels, and upgrades to increase isobutane off-loading may also be required. Additions to the LPG loading facilities will include additional LPG storage and additional LPG loading rail facilities. The changes at the DDU will include feed pump and exchanger upgrades along with a new DDU reactor. The Project will result in associated actual emissions increases at several refinery process units as a result of the increase in utilization. The Project will not result in a significant emission increase or significant net emission increase in air emissions from the refinery and is therefore not subject to federal New Source Review (NSR) requirements.

The Project's estimated start of construction date is in April 2012. The new and modified equipment are expected to begin operations in 2013 and 2014.

Rule R307-401-3(b) requires submittal of a NOI to "make modifications or relocate an existing installation which will or might reasonably be expected to increase the amount or change the effect of, or the character of, air contaminants discharged, so that such installation may be expected to become a source or indirect source of air pollution." The Project will result in an increase in the amount of air contaminants discharged from multiple emission units. Rule R307-401-5 requires that the NOI contain specific information related to the process, nature of emissions, control device(s), and regulatory applicability and compliance.

This NOI is organized as follows:

- Section 2.0 contains a project description,
- Section 3.0 contains an NSR applicability analysis,
- Section 4.0 contains a description of regulatory applicability and compliance demonstration,
- Section 5.0 contains a summary of the NOI requirements,
- Attachment A contains a site diagram,
- Attachment B contains the project emission calculations,

- Attachment C contains EPA guidance on NSR project aggregation, and
- Attachment D contains a reference letter from EPA Region 4.
- Attachment E contains Form 1 and the NOI checklist.



## 2.0 Project Description

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This section includes a general description of the facility and details of the proposed Project.

### 2.1 General Facility Information

The Tesoro Salt Lake City Refinery is located at 474 West 900 North, Salt Lake City, Utah. The refinery is located in a nonattainment area for  $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$ , and  $\text{SO}_2$ . The area is also a designated maintenance area for ozone (VOC and  $\text{NO}_x$ ) and CO. Attachment A includes a figure which shows the location of the refinery in Salt Lake City.

### 2.2 Modified Process Units

The Project involves changes to the following process areas of the refinery:

1. Waxy Crude Handling and Processing
2. Fluidized Catalytic Cracking Unit (FCCU)
3. Alkylation Unit (Alky)
4. LPG Loading Facilities
5. Distillate Desulfurization Unit (DDU)

Each of these process areas are discussed in additional detail below.

#### 2.2.1 Waxy Crude Handling and Processing Changes

The waxy crude facilities will be modified as part of the Project to increase Black and Yellow Wax deliveries and processing of the waxy crudes. The overall objective is to install truck unloading facilities and provide enough storage through tank optimization, replacement of one tank to handle additional Black Wax crude, and installation of an additional tank for Yellow Wax crude. Pump, exchanger, and column upgrades at the Crude Unit will allow the unit to handle the crude. The existing desalters may be modified or a new desalter may be installed. Wastewater may be treated to reduce the benzene content.

##### 2.2.1.1 Crude Unit Process Description

The fractionation tower at the Crude Unit is used to separate crude oil into separate streams by heating crude oil and then drawing the streams from the tower at their varying boiling points. For energy recovery, the product streams are used to heat crude entering the unit using a series of exchangers. At the appropriate location in the pre-heat train, the crude is washed to remove salts in a Desalter. Following the pre-heat train the Crude Heater Furnace (H-101) is used to further heat the

crude prior to the crude fractionator. The fractionator is used to separate the streams by their boiling point. Several pumparounds in the fractionator are used to transfer heat from the fractionator into the crude feed. The streams exiting the fractionator are then routed to other units for further processing.

#### **2.2.1.2 Unloading Rack**

The unloading rack will be used to unload trucks containing both Yellow and Black Wax crude.

Proposed physical changes at the unloading rack include the following:

- A new loading bay to accommodate Yellow and Black Wax crude. The existing rack will be utilized for overflow trucks. The truck rack will utilize a sump that can be pumped out. The sump will be heated and appropriately sized to accommodate a spill.
- Transfer piping from the new unloading rack to a new header to Tank 188 and Tank 186.

#### **2.2.1.3 Waxy Crude Storage Tanks**

Tesoro currently uses Tank 188 as one of its primary storage/working tanks for Black Wax crude. Tesoro proposes to replace the existing Tank 188 due to the age of the current tank and install an additional tank (Tank 186) for Yellow Wax Crude. The specifications of the replacement Tank 188 and Tank 186 are as follows:

- Black Wax and Yellow Wax crude charge pumps will be installed at/near the new tank to the Crude Unit.
- A replacement Tank 188 and Tank 186 will be constructed as nominal 50 MBBL tanks with a standard fixed roof and internal floating roof (IFR). They will be equipped with internal floor-mounted steam coils capable of maintaining a full tank heated to approximately 180 °F.

Tesoro currently uses Tank 291 as its other primary storage/working tank for Black Wax crude. Tesoro will continue to use Tank 291 for storage of Black Wax crude at a rate similar to current operations.

#### **2.2.1.4 Crude Unit Changes**

The crude unit is being modified to process increased rates of waxy crudes. The modifications will include:

- Upgrades to charge, booster, and bottoms pumps
- Changes in the heat exchange configuration to improve heat recovery
- Upgrades or replacement of the Desalter to remove crude contaminants
- Upgrades to the crude fractionation column

#### **2.2.1.5 Benzene NESHAP Compliance**

With the modifications to the crude unit, Tesoro is evaluating whether additional controls will be required to treat the wastewater to control benzene. Several options are being evaluated for benzene control and the appropriate technology will be selected to meet benzene limits in the wastewater. Tesoro is considering an air stripper followed by either carbon absorption or thermal oxidation. Tesoro has conservatively considered both control options in the project emission calculations.

### **2.2.2 Fluidized Catalytic Cracking Unit (FCCU) Changes**

The proposed changes to the FCCU will increase gasoline and diesel production from the refinery by increasing the FCCU's conversion and capacity. The conversion will be increased by extending and expanding the FCCU riser. FCCU conversion will be maintained at higher rates with a new wet gas compressor, absorber stripper, and debutanizer column at the Vapor Recovery Unit (VRU).

#### **2.2.2.1 Process Description**

The FCCU uses heat, pressure and catalysts to convert heavy oils into lighter products such as gasoline and diesel. The FCC process uses a catalyst in the form of very fine particles that act as a fluid when aerated. Fresh feed is preheated and introduced into the riser with hot regenerated catalyst, vaporizing the feed. The hydrocarbon vapors are separated from the catalyst particles by cyclones in the reactor (reactor cyclones). The reaction products are sent to a fractionator for separation. The spent catalyst from the FCCU is regenerated by a controlled combustion process in the regenerator to remove (burn off) the coke deposited on the catalyst, and recycled back to the riser/reactor complex. The offgases from the catalyst regenerator are routed to the CO Boiler and an Electrostatic Precipitator (ESP). The overhead (lighter) products from the fractionator are partially condensed and the liquid and vapor are sent to the VRU for further processing.

The VRU takes the lighter products from the FCC and separates them into various products. After being condensed in the main fractionators, the overhead gases are compressed and routed to an absorber for recovery of LPG from fuel gas. The liquids condensed in the main fractionators overhead are routed to several columns to separate heavy FCC gasoline (HCN), light FCC Gasoline (LCN), a mixture of propylene and propane, and a mixture of normal butane, isobutane, and butenes. The HCN is routed to a gasoline hydrotreater for sulfur removal and then to gasoline blending. Light FCC gasoline is routed to gasoline blending. The mixed propylene / propane and a mixture of normal butane, isobutane, and butenes are routed to the alkylation unit. The alkylation unit reacts propylene and butenes with isobutane to produce high quality alkylate for gasoline blending. A portion of the mixed propylene / propane may also be routed directly to sales.

#### **2.2.2.2 FCCU Riser Changes**

The proposed new FCCU riser will increase the riser residence time to allow sufficient time to crack the heavy oil from the atmospheric resid into lighter products. As a result, the recycle rate of Heavy Cycle Oil (HCO) will be reduced and the selectivity of the cracking will be improved resulting in less fuel gas and coke produced due to overcracking by the unit. The riser portion of the project will not increase the design feed rate to the FCCU or the maximum coke burn rate at the FCCU regenerator.

Proposed physical changes include the following:

- Install a new riser with increased residence time for improved heavy oil cracking.
- Install a new rough cut cyclone.
- Install new secondary cyclones, a new plenum and a new, larger overhead line.
- Modify the Main Fractionator internals.
- Relocate the sponge oil return line.

There will be no modifications to the FCCU regenerator, CO boiler, or ESP as part of this Project.

#### **2.2.2.3 VRU Upgrade**

The proposed physical changes to the VRU will increase the unit capacity of the FCCU without loss of conversion. The wet gas compressor will be replaced with an electric motor driven compressor for the increased rate. Proposed physical changes include the following:

- Replace existing wet gas compressor with a new wet gas compressor with an electric motor drive.
- New wet gas compressor discharge air fin, cooling water and glycol coolers.
- Install a demisting system on the wet gas compressor KO drum (F-101).
- Replace existing absorber and associated equipment with a higher pressure absorber / stripper for increased rate and improved recovery of LPG from fuel gas.
- Install new absorber/ stripper column with new reboilers using both heat recovery from the main fractionators and steam.
- Install new higher pressure separator.
- Replace the existing debutanizer tower with a new tower reconfigured for liquid from the absorber / stripper with new overhead condensers and reboiler using steam and recovered heat from the main fractionators.
- Upgrade the depropanizer tower to separate propylene/propane from the mixed butanes.
- Upgrade the pre-fractionator tower and reconfigure to separate the debutanizer bottoms into light and heavy cat naphtha.

- Install new depropanizer overhead piping and condensers.

There will be an increase in potential emissions from startup, shutdown, and malfunction events as a result of installing larger vessels at the VRU.

#### **2.2.2.4 CO Boiler Bypass Installation**

A bypass around the CO boiler may be installed routing gases from the FCCU regenerator to a new quench system and then to the ESP. The quench system would be used to control the temperature of the gas stream to maintain ESP performance. This bypass would be used in the event of issues at the CO Boiler requiring maintenance and/or shutdown.

The existing CO Boiler bypass stack (PS #9) may be eliminated as part of this Project. The changes would allow Tesoro to use its ESP to control particulate emissions during bypass events. It is important to note that Tesoro views this CO Boiler bypass work as being a separate project from the Waxy Crude Processing Project, given that it addresses the operational issue of being able to use the ESP during bypass events, and it not economically or technically dependent upon the larger Waxy Crude Processing Project. However, it has been included with this application given that the work would be expected to occur during the same timeframe.

### **2.2.3 Alkylation Unit**

The alkylation unit reacts propylene and butylene with isobutane (both purchased and internally produced) to produce a high octane gasoline component (alkylate). The reaction is catalyzed with sulfuric acid which is mixed with the feed and high rates of recycle isobutane and then separated. The heat of reaction is removed by flashing a portion of the feed with the vapor compressed and then condensed. The condensed liquid feeds the depropanizer to recover LPG and recycle the isobutane back to the reactor. The reactor effluent is treated and then fractionated to separate recycle isobutane (back to the reactor), butane product to storage, and alkylate to gasoline blending.

The alkylation unit will be modified for increased throughput with upgrades of pumps, turbines, and exchangers for increased rate. The isobutane unloading facilities will be upgraded to supply the alkylation unit.

### **2.2.4 LPG Loading Facilities**

Mixed propylene/propane can be routed to storage and then loaded into rail cars if it is not processed in the alkylation unit. The LPG loading facilities will be upgraded with additional storage and rail loading facilities for increased unloading and loading of propane, isobutane, butane, and propylene.

The completion of the Project will result in an increase in loading and unloading of liquefied petroleum gases at the LPG Rack. Increases at the LPG Rack include the following activities:

- Propane loading by truck,
- Propylene loading by rail,
- Isobutane unloading by truck and rail, and
- Butane loading and unloading by rail.

### **2.2.5 Distillate Desulfurization Unit (DDU) Changes**

This Project will increase the DDU capacity while improving energy efficiency and maintaining safe operation. Additional details are presented below.

#### **2.2.5.1 Process Description**

The charge to the DDU from the Crude Unit and FCCU is combined in the feed surge drum. The charge oil is then combined with recycle and make-up hydrogen. The feed enters a two bed reactor which operates with a hydrogen quench in its middle. The reactor effluent enters the reactor feed/effluent exchangers. Reactor effluent is then separated into oil, gas, and sour water streams. The oil stream enters the fractionator for separation into diesel product, gas, and naphtha. The fractionator bottoms stream (diesel product) is pumped through heat exchangers and to storage. The fractionator overhead vapor is cooled in the overhead condensers compressed in the K687 compressor, treated in the low pressure amine contactor, and routed to fuel gas. The overhead naphtha is currently pumped to the top of the crude tower but may be rerouted to the Gasoline Hydrotreater (GHT) stabilizer, which would not impact refinery emissions.

#### **2.2.5.2 Equipment Changes**

The Project will include the following changes:

- Install a new feed pump replacing one of the existing pumps
- Install new reactor feed/effluent exchangers.
- Install a new reactor to meet distillate specifications
- Modify tower internals and change the location of the feed tray.
- Install a new reboiler/diesel product pump
- Reconfigure the feed and reboiler heaters from a single pass to a dual pass furnace design.
- Install a common convection section for the feed and reboiler furnaces F-680 and F-681.
- Repipe the fractionator feed bottoms exchangers from the current configuration of 4 shells in series to 2 parallel banks of 2 exchangers in series.

The overhead naphtha plus reflux flow capacity may be increased, or the overhead naphtha stream may be rerouted to the GHT stabilizer to minimize the reprocessing cost.

## **2.3 Affected Non-Modified Process Units**

The changes at the waxy crude receiving and storage areas, FCCU, VRU, Alky, LPG Loading, and DDU will impact some of the refinery's current operations and existing equipment. These impacts were simulated using process modeling software and the linear programming model, which incorporates both the FCCU model and gas plant simulation. The impacts determined through the use of the process model are described in the subsections below.

Fuel gas production and consumption will be higher but no modifications are anticipated to the fuel gas system. Additional fuel gas will be produced as a result of the increased rate and conversion at the FCCU offset with increased recovery of LPG. The Project is also likely to increase the heating value of the fuel gas and require less natural gas to be purchased as make-up to the V-917 fuel gas drum. Another impact to the fuel gas system compared to current operations is the pending startup of the Benzene Saturation Unit (BSU), which will be a consumer of hydrogen from the Ultraformer Unit (UFU). Tesoro has not yet begun operations of the BSU and is therefore not considered an affected process unit. Tesoro expects the H<sub>2</sub>S content in the fuel gas system to decrease compared to baseline conditions, but for purposes of this NOI, has conservatively assumed that the H<sub>2</sub>S concentration will be unchanged compared to the current operations.

To support the increased production rates and associated desulfurization, additional hydrogen may be purchased through Tesoro's existing contract with Linde Gas North America, LLC (Linde). Linde is located at 2351 North 1100 West, Salt Lake City, operating under Approval Order DAQE-GN0130910004-08. Linde is a separate stationary source under NSR since it does not meet all three criteria to be considered a single stationary source with Tesoro (contiguous or adjacent, same SIC code, common control). In addition, Tesoro will continue to consume less than 50% of the hydrogen produced by Linde following the Project so the plant is not considered a "support facility" under federal NSR rules.<sup>2</sup>

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<sup>2</sup> August 25, 1999 letter from Robert Miller of EPA Region 5 to William Baumann of Wisconsin DNR.

### **2.3.1 Ultraformer Unit (UFU)**

The Project will result in increased utilization of the UFU. There will also be an increase in gas firing rate at the UFU Furnace (F-1), UFU Regeneration Heater (F-15), and the Ultraformer compressors (K1s).

### **2.3.2 Gasoline Hydrotreater (GHT)**

Higher conversion to lighter products will result in increased utilization of the GHT. This will require additional steam for operation of the GHT stripper reboiler. There will also be an increase in gas firing rate at the GHT process heater (F-701).

### **2.3.3 Sulfur Recovery Unit (SRU)**

The increase in throughput of lighter products from the FCCU and upgrades to the DDU could result in an increase in sulfur in the feed to the SRU.

As a separate contemporaneous project, Tesoro proposes to install a tail gas treatment unit (TGTU) at its Sulfur Recovery Unit (SRU) as part of this Project to reduce SO<sub>2</sub> emissions. TGTUs are designed to convert additional sulfur compounds back into H<sub>2</sub>S for recovery as elemental sulfur. This project is described further in Section 3.5.1.

### **2.3.4 Cogeneration Unit Turbines**

There will be several new electric pumps and an electric wet gas compressor installed as part of the Project. Minimal emission impacts are anticipated as the refinery has frequently operated the Cogeneration Turbines at maximum levels and exported electricity. This Project will result in a reduction of exported power.

### **2.3.5 Cogeneration Unit Heat Recovery Steam Generating Units (HRSGs)**

The Project will result in additional steam requirements at multiple process units to be produced by the Cogeneration Heat Recovery Steam Generators (HRSGs). A refinery-wide steam balance was used to determine the projection of refinery steam requirements following the Project.

### **2.3.6 Cooling Tower UU3**

The Project will include modifications to heat exchangers that will increase exchanger sizes. Cooling water rates will remain relatively constant; however, heat duty load to the cooling tower will increase. Additionally, Tesoro will clean out the cooling tower lines to improved circulation and perform maintenance on the drift eliminator to ensure proper operation. As a result of increases in



exchanger size and therefore surface area where process fluid leaks could occur, Tesoro has conservatively assumed that emissions will increase from the cooling tower.

### **2.3.7 Storage Tanks**

The Project will require a new Black Wax crude storage tank to replace the existing Tank 188 and a new Tank 186.

There will also be minor increases in tank emissions associated with the increased throughput of products. All existing tanks which store materials for which an increase in throughput is projected are identified below.

- Tanks 204, 212, 213: Distillate fuel oil No. 2,
- Tank 242: Heavy catalytic naphtha,
- Tanks 243, 252, 324, 325, 326, 327, 330, 504: Gasoline,
- Tank 321: Light catalytic naphtha,
- Tank 331: Alkylate, and
- Tank 503: Ethanol.

Tank 291 is used to store Black Wax crude, a material for which an increase in throughput is projected. Tesoro is voluntarily taking a VOC emission limit on this tank such that no emission increase will occur. Refer to Appendix B, Section B.2.11 for a description of the requested emission limit.

### **2.3.8 Loading Rack Impacts**

The completion of the Project will result in an increase in loading of gasoline and diesel at the Transport Loading Rack. Tesoro is requesting removal of the gasoline loading limit of 450 MMgal/yr as part of this Project in order to accommodate the projected gasoline throughput following Project completion. Additional details of this request are included in Section 3.1.1.1.

## **2.4 Project Schedule**

The estimated start of construction is April 1, 2012, pending permit approval. The first phase of the project is expected to begin operations in 2013. The second phase of the project is expected to begin operation in 2014.

## 2.5 Relationship to Other Projects

Tesoro has considered the relation of this Project with two recently permitted projects (CONOx and FCCU Overhead Condensing), and the 2007 FCCU Reliability Project. Tesoro has considered whether the projects need to be aggregated for purposes of federal New Source Review (NSR) applicability as a single “physical change.”

EPA’s policy states that nominally separate changes, which are sufficiently related based on established criteria, be aggregated into a single common project for the purpose of determining NSR applicability (i.e., determining the project related emissions increases). To do so, potentially related individual actions at a source are evaluated to determine whether the activities in the aggregate should be evaluated as a single project (i.e., one physical or operational change). The EPA policy documents on aggregation outline an approach that relies upon case-specific factors (e.g., timing, funding, and the company’s records) and the relationship between nominally separate activities. Activities are aggregated together for purposes of determining NSR applicability if there is a technical or economic relationship between the activities. A collection of EPA’s past policies relevant to whether a project should be aggregated is included in the April 15, 2010 Federal Register notice entitled “Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR): Aggregation; Reconsideration.”<sup>3</sup> A summary of those and other relevant aggregation-related information related to that notice is included in Appendix C.

The terms “technically dependent” and “technical dependence” describe the interrelationship between projects such that one project is incapable of performing as planned in the absence of the other project. This means that, absent another project, the process change cannot operate without significant impairment, or for the planned amount of hours, or at the planned rating or production level, or that it operates in a manner that results in a product of inferior quality. Activities are dependent on each other for their economic viability if the economic revenues or “Return on Investment” (ROI) associated with the project could not be realized without the completion of another project. EPA proposed an approach that would require that a source treat one project as economically dependent on another if it is no longer economically viable without the completion of the other project(s).<sup>4</sup> Economic viability is measured by assessing the ROI or payback of a project,

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<sup>3</sup> 75 Fed. Reg. 19570, 19,571.

<sup>4</sup> 71 Fed Reg 54246.

such that a project is not economically viable if it does not pay for itself (e.g., yield a positive ROI) in the absence of another related project.

Based on this guidance for purposes of the analysis performed in support of this application, to determine if a technical or economic relationship existed the following questions were asked for each project that was identified and reviewed:

1. Would the Waxy Crude Processing Project's operating hours, production rate, or product quality be impaired if the additional project (under review) was not or had not been performed?
2. Would the additional project's (under review) operating hours, production rate, or product quality be impaired if the Waxy Crude Processing Project was not performed?
3. Would the ROI associated with the Waxy Crude Processing Project be reduced if the additional project (under review) was not or had not been performed?
4. Would the additional project's (under review) ROI be reduced if the Waxy Crude Processing Project was not performed?

As the first step in the analysis, a listing of the potential projects requiring evaluation was developed. Projects were identified based on their proximity in timing with the proposed action and their possible relationship with emissions units that will be physically modified as part of the proposed project and their objective relative to the Project's objective. The results of this effort identified the following projects for review:

- CONOx Project,
- FCCU Overhead Condensing Project, and
- 2007 FCU Reliability Project.

**CONOx Project:** The CONOx Project has been recently approved by the Utah Department of Environmental Quality and also involves physical modifications at the FCCU. A review of this project's technical objective (i.e., to allow operation of the catalyst regenerator using a deeper partial burn) indicates that to be conservative this work should be aggregated with the Waxy Crude Processing Project. As a result, Tesoro will not commence construction on the CONOx Project until the same time as other changes are made to the FCCU under this proposed action, and has considered the emissions impact of the CONOx Project as part of the projected emissions associated with the Waxy Crude Processing Project.

**FCCU Overhead Condensing Project:** The FCCU Overhead Condensing Project has been recently approved by the Utah Department of Environmental Quality and also involves physical modifications at the FCCU. A review of this project's technical objective (i.e., to improve the operability of the

FCCU overhead system) indicates that to be conservative this work should be aggregated with the Waxy Crude Processing Project. As a result, Tesoro will not commence construction on the FCCU Overhead Condensing Project until the same time as the changes to the FCCU associated with the Project, and has considered the emissions impact of the FCCU Overhead Condensing Project as part of the projected emissions following the Project.

**2007 FCU Reliability Project:** As noted in the NOI for 2007 FCU Reliability Project (2007 Project), the project was designed to “increase the reliability of the FCU” and “reduce the regenerator temperature and pressure, increasing feed flexibility by allowing the use of heavier feed stocks.” As further explained, “[t]he intent of the project is to improve the reliability of the FCU, not to increase feed capacity nor the production of gasoline and/or diesel.”<sup>5</sup> Rather, before and after the project, “FCU throughput capacity . . . remain[ed] at 23,000 barrels per day and production of gasoline and diesel [did] not increase significantly.”<sup>6</sup>

In contrast, the Waxy Crude Processing Project’s objective is to increase the facility’s capacity to produce clean fuels based on significant changes in market conditions that occurred after 2007. Traditionally, refineries in the Salt Lake City have been constrained by the limited market in Utah and the limited ability to ship product to other regions of the country. However, on April 19, 2006, Holly Corporation announced that they were exploring the possibility of constructing a 12-inch refined products pipeline project from Salt Lake City, Utah to Las Vegas, Nevada (the “UNEV Pipeline”). On July 9, 2007, Holly Corporation announced plans to construct the UNEV Pipeline. When construction is completed, this pipeline will significantly increase demand for refined products produced in the Salt Lake City area and will allow area refineries to efficiently operate at higher capacities. The proposed project will increase the refinery’s gasoline production capacity, taking advantage of this pipeline and the new market openings created by the pipeline for the Salt Lake City refineries.

In addition, beginning in 2010, Black Wax and Yellow Wax crudes became advantaged crudes due to their cost relative to other crudes available to the Salt Lake City Refinery. As a result, the project economics are largely based on the ability to process additional Black Wax and Yellow Wax crude.

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<sup>5</sup> May 2006 Fluid Catalytic Cracking Unit (FCU) Reliability Project, Notice of Intent, Section 2.3, page 4.

<sup>6</sup> IBID Section 2.4, page 5.

Based on the differing objectives of these two projects, it is concluded that the two projects are not substantially related from a technical or economic perspective and, therefore, constitute independent actions. More specifically, the following is the case:

1. **The Waxy Crude Processing Project's operating hours, production rate, or product quality would not be impaired if the FCU Reliability Project had not been performed.** The objective of the work planned as part of the Waxy Crude Processing Project, and more specifically at the FCCU, is to increase gasoline and diesel production by increasing the FCCU's bottoms conversion and capacity (i.e., to improve the control of and the extent of the cracking reactions that occur in the FCCU reactor). Extending and expanding the FCCU riser will increase the bottoms conversion achieved at the FCCU. The modifications to the riser will in-turn allow the FCCU's conversion to be maintained at the higher rates allowed by the changes to the existing wet gas compressor at the VRU. These enhancements, and the subsequent ability to produce more diesel and gasoline product from the newly identified opportunity crude, (i.e., Black Wax and Yellow Wax crude) define the technical objective of the Waxy Crude Processing Project. In contrast, the FCU Reliability Project was directed at improving the reliable operation of the FCCU regenerator. This was accomplished through multiple changes to the regenerator portion of the FCCU directed at improving spent catalyst distribution, combustion air distribution, mixing between the catalyst and combustion air. Additional changes were made to the regenerator cyclones and stripper to reduce the catalyst particulate emissions and the level of afterburn in the regenerator. There is no technical relationship between the changes planned to improve the FCCU's diesel and gasoline production as part of the Black Was Processing Project and the changes made as part of the FCU Reliability Project to improve the reliable operation of the FCCU regenerator.
2. **The FCU Reliability Project's operating hours, production rate, or product quality are not improved by the Waxy Crude Processing Project.** As concluded above, there is no technical relationship between the changes planned to improve the FCCU's diesel and gasoline production as part of the Black Was Processing Project and the changes made as part of the FCU Reliability Project to improve the reliable operation of the FCCU regenerator.
3. **The ROI associated the Waxy Crude Processing Project is not changed by the fact that the FCU Reliability Project was performed.** The ROI associated with the Waxy Crude Processing Project is based on the additional barrels of diesel and gasoline that will be produced at the increased processing rates allowed by the changes to the FCCU riser, fractionator and downstream VRU. At the time the FCU Reliability Project was developed and approved, Black Wax and Yellow Wax crudes were not considered to be opportunity crudes and the UNEV had not yet been announced. As a result, the ROI associated with and used to justify the FCU Reliability Project was based upon a more stable regenerator operation and the benefits the improved stability would create. Thus, there is no economic relationship between Waxy Crude Processing Project and the FCU Reliability Project.
4. **The ROI associated with the FCU Reliability Project's ROI is not improved by the Waxy Crude Processing Project.** As concluded above, there is no economic relationship between the Waxy Crude Processing Project and the FCU Reliability Project.

As a final consideration, it should be noted that the two projects are separated by six (6) years as the Waxy Crude Processing Project will not be initiated until spring 2012. As a result, it is concluded

that these two projects constitute separate and independent actions by the Tesoro Salt Lake City Refinery.

## 3.0 NSR Applicability Analysis

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Utah rules implement the New Source Review (NSR) permitting program for major sources and major modifications. Rule R307-403 and R307-405 implement the federal Nonattainment New Source Review (NNSR) and Prevention of Significant Deterioration (PSD) preconstruction permitting programs, respectively. Tesoro is currently a major source as defined in Utah Rule R307-100 and in these federal permitting programs. Therefore, Tesoro has completed an applicability analysis to determine if this Project is a major modification as defined under Utah rules and the NSR permitting program.

The NSR pollutants are covered either by the PSD or NNSR permitting programs, but for purposes of determining applicability as a major modification, the significance thresholds are the same. For simplicity, Tesoro uses the PSD definitions to describe the applicability analysis. The Utah rules, approved by EPA on July 15, 2011, reference the PSD rules in effect on July 1, 2008. For purposes of determining the applicability of the proposed Project, the PSD rules at 40 CFR 52.21 are incorporated by reference into the Utah rules with one exception relevant to this analysis. The exception relevant to permitting of this Project is regulation of greenhouse gases in the same manner as described under the current version of 40 CFR 52.21. The applicability analysis therefore relies upon and references 40 CFR 52.21.

### 3.1 “Hybrid Test” of PSD Applicability

An NSR applicability analysis has been conducted for the Project to determine if it is a “major modification” under NSR regulations. Because this project involves the proposed modification to both “existing emission units” and “new emissions units,” the “hybrid test” is used to determine if a “significant emissions increase” and a “significant net emissions increase” of a “regulated NSR pollutant” will occur. The hybrid test is described as the following:<sup>7</sup>

*“... A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the emissions increases for each emissions unit, using the method specified in paragraphs (a)(2)(iv)(c) through (e) of this section as applicable with respect to each emissions unit, for each type of emissions unit equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section)...”*

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<sup>7</sup> 40 CFR 52.21(a)(2)(iv)(f).

The hybrid test refers to the use of two emissions increase calculation methods listed in paragraphs 40 CFR 52.21(a)(2)(iv)(c) and (d). The methods prescribed for existing emissions units are described further below. The remainder of this section focuses on the emissions increase test.

An increase is significant if it exceeds the annual ton per year (tpy) thresholds known as the PSD significant emission rates, which are listed in Table 3-1 for only those regulated NSR pollutants that are emitted in quantifiable amounts from emission units affected by this project.

**Table 3-1. NSR Significant Emission Rates**

<b>Pollutant<sup>A</sup></b>	<b>Significant Emission Rate (tpy)</b>
Particulate matter (PM)	25
Particulate matter less than 10 microns (PM <sub>10</sub> )	15
Particulate matter less than 2.5 microns (PM <sub>2.5</sub> ) <sup>B</sup>	10
Sulfur dioxide (SO <sub>2</sub> )	40
Nitrogen oxides (NO <sub>x</sub> )	40
Carbon monoxide (CO)	100
Ozone (O <sub>3</sub> )	40 <sup>C</sup>
Sulfuric Acid Mist (H <sub>2</sub> SO <sub>4</sub> )	7
Greenhouse gases (mass basis)	0
Greenhouse gases as carbon dioxide equivalents (CO <sub>2</sub> e)	75,000 <sup>D</sup>

<sup>A</sup> Only those NSR pollutants that are emitted in quantifiable amounts from emission units affected by this project are shown in the table. Condensable particulate matter is included within the definition of PM, PM<sub>10</sub>, and PM<sub>2.5</sub> as of January 1, 2011.

<sup>B</sup> The significant emission rate for direct PM<sub>2.5</sub> emissions is 10 tpy; additionally this includes 40 tpy of SO<sub>2</sub> emissions and/or 40 tpy of NO<sub>x</sub> emissions unless they are demonstrated not to be a PM<sub>2.5</sub> precursor.

<sup>C</sup> The NSR significant emission rate is assessed based on emissions of volatile organic compounds (VOC).

<sup>D</sup> Greenhouse gases are defined as the aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The procedures in 40 CFR 52.21(b)(49) are followed to calculate the CO<sub>2</sub> equivalent emissions. Greenhouse gases are considered a regulated pollutant for a given project if the project emissions increase of CO<sub>2</sub>e exceeds 75,000 tpy.



The definition of “regulated NSR pollutant” includes any pollutant that is “subject to regulation”:<sup>8</sup>

*(50) Regulated NSR pollutant, for purposes of this section, means the following:*

...

*(iv) Any pollutant that otherwise is subject to regulation under the Act as defined in paragraph (b)(49) of this section.*

The definition of “subject to regulation” includes detailed provisions on the inclusion of greenhouse gases (GHG):<sup>9</sup>

*(49) Subject to regulation means, for any air pollutant, that the pollutant is subject to either a provision in the Clean Air Act, or a nationally-applicable regulation codified by the Administrator in subchapter C of this chapter, that requires actual control of the quantity of emissions of that pollutant, and that such a control requirement has taken effect and is operative to control, limit or restrict the quantity of emissions of that pollutant released from the regulated activity. Except that:*

*(i) Greenhouse gases (GHGs), the air pollutant defined in §86.1818–12(a) of this chapter as the aggregate group of six greenhouse gases: Carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, shall not be subject to regulation except as provided in paragraphs (b)(49)(iv) through (v) of this section. ...*

*(iv) Beginning January 2, 2011, the pollutant GHGs is subject to regulation if:*

*( a ) The stationary source is a new major stationary source for a regulated NSR pollutant that is not GHGs, and also will emit or will have the potential to emit 75,000 tpy CO<sub>2</sub>e or more; or*

*( b ) The stationary source is an existing major stationary source for a regulated NSR pollutant that is not GHGs, and also will have an emissions increase of a regulated NSR pollutant, and an emissions increase of 75,000 tpy CO<sub>2</sub>e or more; and,*

*(v) Beginning July 1, 2011, in addition to the provisions in paragraph (b)(49)(iv) of this section, the pollutant GHGs shall also be subject to regulation*

*( a ) At a new stationary source that will emit or have the potential to emit 100,000 tpy CO<sub>2</sub>e; or*

*( b ) At an existing stationary source that emits or has the potential to emit 100,000 tpy CO<sub>2</sub>e, when such stationary source undertakes a physical change or change in the method of operation that will result in an emissions increase of 75,000 tpy CO<sub>2</sub>e or more.*

Pursuant to §52.21(b)(49), GHG is not subject to regulation and thus is not a regulated NSR pollutant if the CO<sub>2</sub>e increase is less than 75,000 tpy. The emissions increase of CO<sub>2</sub>e from the proposed project has been calculated in this NOI pursuant to paragraph §52.21(a)(2)(iv) as follows:<sup>10</sup>

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<sup>8</sup> 40 CFR 52.21(b)(50)

<sup>9</sup> 40 CFR 52.21(b)(49)

*(iii) The term emissions increase as used in paragraphs (b)(49)(iv) through (v) of this section shall mean that both a significant emissions increase (as calculated using the procedures in paragraph (a)(2)(iv) of this section) and a significant net emissions increase (as defined in paragraphs (b)(3) and (b)(23) of this section) occur. For the pollutant GHGs, an emissions increase shall be based on tpy CO<sub>2</sub>e, and shall be calculated assuming the pollutant GHGs is a regulated NSR pollutant, and “significant” is defined as 75,000 tpy CO<sub>2</sub>e instead of applying the value in paragraph (b)(23)(ii) of this section.*

“Net emissions increase” means the amount by which the sum of the following exceeds zero:<sup>11</sup>

*“(a) The increase in emissions from a particular physical change or change in the method of operation at a stationary source as calculated pursuant to paragraph (a)(2)(iv) of this section; and*

*(b) Any other increases and decreases in actual emissions at the major stationary source that are contemporaneous with the particular change and are otherwise creditable. Baseline actual emissions for calculating increases and decreases under this paragraph (b)(3)(i)(b) shall be determined as provided in paragraph (b)(48) of this section, except that paragraphs (b)(48)(i)(c) and (b)(48)(ii)(d) of this section shall not apply.”*

The project emissions increase is calculated as the sum of emissions increases from the existing emissions units that are impacted by this project. If the project emissions increase for a regulated NSR pollutant is less than the significant emission rate, NSR is not required for that pollutant. If the emissions increase is greater than the corresponding NSR significant emission rate, a source has four options:

1. Accept limits on the new or existing emissions units impacted by the project in order to maintain a project emissions increase less than the NSR significant emission rate,
2. Conduct a netting analysis of contemporaneous creditable increases and decreases to determine if the net emissions increase is less than the NSR significant emission rate,
3. Use options 1 and 2 together to maintain the net emissions increase to a level less than the NSR significant emission rate, or
4. Undergo NSR review for the project.

The procedures for performing a netting analysis, as mentioned in Option 2 above, are described in Section 3.1.3. Tesoro is following Option 3 for this Project because it is proposing an SO<sub>2</sub> emission limit at the SRU and has conducted a netting analysis for SO<sub>2</sub> emissions.

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<sup>10</sup> 40 CFR 52.21(b)(49)(iii)

<sup>11</sup> 40 CFR 52.21(b)(3)(i).

### 3.1.1 Actual-to-Projected-Actual Test for Existing Emissions Units

In 40 CFR 52.21(a)(2)(iv)(c), the actual-to-projected-actual applicability test is described as the following:

*“(c) Actual-to-projected-actual applicability test for projects that only involve existing emissions units. A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the projected actual emissions (as defined in paragraph (b)(41) of this section) and the baseline actual emissions (as defined in paragraphs (b)(48)(i) and (ii) of this section), for each existing emissions unit, equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section).”*

Terms within this paragraph that have specific definitions include “existing emissions unit,” “projected actual emissions,” and “baseline actual emissions.” An “existing emissions unit” is any part of a stationary source that emits any regulated NSR pollutant and has been in existence for at least two years from the date it first operated.<sup>12</sup> A description of “projected actual emissions” and “baseline actual emissions” are as follows.

#### 3.1.1.1 Projected Actual Emissions

“Projected actual emissions” are calculated as:<sup>13</sup>

*“... the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the 5 years (12-month period) following the date the unit resumes regular operation after the project, or in any one of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that regulated NSR pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source.”*

A source shall consider when determining projected actual emissions any relevant business or regulatory information. In addition, fugitive emissions and emissions associated with startups, shutdowns and malfunctions must be calculated, as applicable. By definition, projected actual emissions shall exclude the portion of the emissions that an existing unit could have accommodated during the baseline period and that are also unrelated to the particular project, including any increased utilization due to product demand growth.<sup>14</sup> A source may use the emission unit's potential to emit in lieu of the aforementioned projected actual emissions calculation.

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<sup>12</sup> 40 CFR 52.21(b)(7)(ii).

<sup>13</sup> 40 CFR 52.21(b)(41)(i).

<sup>14</sup> 40 CFR 52.21(b)(41)(ii)(c).

The projected actual throughput for units is based on engineering and business projections. Projected emissions are calculated based on annual throughput following startup of the Project and emission factors representative of expected operation. The emission factors used for the projected emissions are generally also representative of the baseline period.

The product demand growth exclusions, or emissions that the units were capable of accommodating during the baseline period, are calculated based on the maximum actual throughput, firing rate, or emission rate experienced during any 1-month period during the 24-month baseline period for all units except the loading racks and storage tanks. A utilization factor of 98% was used in the calculation of annualized emissions that the emission units were “capable of accommodating” during the baseline period. The utilization factor was multiplied by the maximum monthly observed throughput rate converted to an annual rate. This utilization factor accounts for normal rate reductions that occur each year due to mechanical or supply issues. Tesoro conservatively assumes that none of these normal rate reductions occurred during the month when the maximum throughput was observed. This 98% utilization factor is equivalent to assuming 175 hours of annual downtime at each unit. It is also important to note that Tesoro did not include this utilization factor in its projected post-project throughputs. The net result is a more conservative estimate of the emissions increase. For loading racks and storage tanks, the emissions that the units were capable of accommodating during the baseline period are conservatively based on the maximum calendar year emissions during the baseline period. Tesoro has reviewed this annualized rate to confirm that it could have been accommodated during the baseline period. The emission factors used to calculate the product demand growth exclusion are generally consistent with those used for projected emissions, with exceptions noted in Attachment B.

The difference between the annualized emissions that the units were capable of accommodating and the baseline actual emissions is excluded (i.e. subtracted from) the projected emissions. The emissions increase is then calculated by subtracting the baseline actual emissions from the projected actual emissions. This approach is consistent with that outlined by EPA Region 4 regarding an applicability analysis completed by Georgia-Pacific Wood Products, LLC, included as Attachment D.<sup>15</sup>

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<sup>15</sup> March 18, 2010 letter from Mr. Worley of EPA Region 4 to Mr. Robinson of Georgia-Pacific Wood Products, LLC.

## SO<sub>x</sub> Emissions Limit at the FCCU

As part of the FCCU Reliability Project, Tesoro voluntarily accepted emission limits of NO<sub>x</sub>, SO<sub>x</sub>, and filterable PM<sub>10</sub> at the FCCU. With this application, Tesoro is requesting relaxation of the SO<sub>x</sub> limit as described below. Tesoro is not requesting any changes to the NO<sub>x</sub> or filterable PM<sub>10</sub> emission limits that were established as part of the previous action.

The emissions limit of 705 tons per year (tpy) SO<sub>x</sub> at the FCCU on a 12-month rolling sum was based on the sum of the historical baseline actual annual emissions plus 39 tpy and was taken to maintain minor modification status for the 2007 FCCU Reliability Project. SO<sub>x</sub> emissions are calculated as the measured SO<sub>2</sub> emissions multiplied by a factor of 1.05.<sup>16</sup> The SER for SO<sub>2</sub> that would otherwise trigger PSD is 40 tpy. A synthetic minor emissions limit is referred to as an “R4” limit, corresponding to the requirements of 40 CFR 52.21(r)(4) which states:

*“At such time that a particular source or modification becomes a major stationary source or major modification solely by virtue of a relaxation in any enforceable limitation which was established after August 7, 1980, on the capacity of the source or modification otherwise to emit a pollutant, such as a restriction on hours of operation, then the requirements or paragraphs (j) through (s) of this section shall apply to the source or modification as though construction had not yet commenced on the source or modification.”*

In short, if relaxation of an enforceable limit that, in and of itself, causes the particular modification (i.e., the 2007 FCCU Reliability) to become a major modification, then the facility is subject to PSD review as if construction had not yet commenced on the modification.

The Waxy Crude Processing Project involves physical changes at the FCCU and will increase the FCCU’s utilization and corresponding SO<sub>2</sub> emissions. The physical changes were not envisioned as part of the 2007 FCCU Reliability project. Based on the analysis described in Section 2.5, the 2007 and 2012 projects are considered separate modifications for purposes of PSD applicability.

The PSD program as promulgated in 1980 relies on an annualized ton per year applicability approach to determine if a project is a major modification.<sup>17</sup> Such an approach takes into account the level of utilization for which the equipment is operated in a year, meaning that a project can choose to avoid

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<sup>16</sup> AO Condition II.B.3.d.1.

<sup>17</sup> The original PSD rule in 1974 had a different applicability test using hourly emissions at maximum capacity before versus after the project. This test is the same as that in the New Source Performance Standards (NSPS) program in 40 CFR 60.

PSD by accepting operational limits on capacity or hours of use. If these limits are made enforceable, they are reflected in the source's PTE.

The EPA was concerned that this new applicability test would allow a source to circumvent the preconstruction requirements of the rule by accepting an operational limit that was unrealistic (i.e., the source intended to use it for longer than was prescribed in order to satisfy profit goals). The source could obtain a minor permit relatively quickly and begin construction earlier than if it had to wait for a major PSD permit, then after startup the source could apply for a major NSR permit to relax the original limit.

EPA addressed this issue through the "source obligation" provision at 40 CFR 52.21(r)(4). In the 1980 final rule (45 FR 52689), EPA described the R4 provision as follows:

*"Finally, as a result of today's policy, a potential problem exists concerning the future relaxation of a preconstruction permit that previously caused a proposed stationary source to enjoy minor rather than major status. For example, a source might evade NSR through agreement to unrealistically stringent operating limitations in its permit, and later obtain a relaxation of this condition. The Agency believes that the problem can be dealt with by 40 CFR §52.21(r)(4), entitled "Source Obligation." That paragraph provides that any owner or operator of a source, who would receive a relaxation of a permit condition that had enabled avoidance of NSR, would then become subject to review for all units subject to the original permit, as if they were new sources. In other words, if operational limitations are to be considered as an aspect of a source's design, it is reasonable that the permit accurately incorporate that design. If such operation is changed, the permit and concomitant obligations should be correspondingly changed."*

Finally, in 1989 EPA described three options available in the event that a PSD avoidance condition will be exceeded (54 FR 27280):

- "1. Enforce the limitations in the permit, but allow the source to retain its minor status when the source intends to adhere to the emissions limitations in the future;*
- 2. Invoke the source obligations in R4 and require the source to obtain a major NSR permit, but without penalty, when there is a legitimate reason for the source to request the relaxation (e.g., as a change in business plans); or*
- 3. Determine that the source obtained a permit containing limitations allowing it to escape major NSR without intending to actually operate as a minor source, with the appropriate penalty for such deliberate circumvention."*

EPA differentiates between circumvention (Option 3) and legitimate business plan changes (Option 2) as a function of addressing operational limits. However, no statement is made in a regulatory preamble as to the disposition of R4 limits when a future physical change is made to the emissions unit. The common belief as to why EPA did not address this is because the policy focuses

on sources that would take a limit, then ask for a relaxation of that limit without any other associated physical or operational change. The key term in the R4 provision is “solely” – the only action requested by the source is to relax the limit that avoided PSD. Therefore, if a legitimate future modification is requested as part of the proposed relaxation, that relaxation is not the sole action being requested.

Based on this regulatory history, it is concluded that the R4 provision was not intended to apply to future legitimate modifications. As another basis for this conclusion, if R4 were to apply to all future modifications, then an emissions unit would be allowed only one minor modification in its entire life. Given the hair-trigger definition of modification where any non-routine change can potentially be a modification to the unit, a source could never expand an emission unit’s capacity to accommodate ever-changing market conditions. The PSD program does not cap emissions on a given unit after a single modification; rather, it evaluates applicability on actual annual emissions resulting from an individual project/modification. As long as a project is not divided into multiple modifications (called “sham” permitting), then each project should be evaluated individually for PSD applicability. If the PSD applicability determination requires that an R4 limit be removed or changed to be consistent with the new potential to emit (or projected actual emissions) of the emissions unit, then a permit modification is needed; however, the original project for which the initial limit was taken should not be subject to PSD review.

It should be noted that the 705 tpy SO<sub>x</sub> limit on the FCCU, which was proposed as part of the 2007 FCCU Reliability Project permitting, is an artifact of the 1980 PSD rule and EPA's policy which generally requires the use of an actual to potential emissions increase test as the basis for to determining PSD applicability. Since then, the 2002 PSD Reform Rule has been incorporated into Utah's approved SIP. Under the Reform Rule, a baseline to projected actual emissions test, which is used to determine the directly attributable project related emissions increases, is allowed. If the baseline to projected actual emissions had been allowed and used as part of the 2007 FCCU Reliability Project's permitting, no annual emissions limit would have been required.

In an April 14, 2011 meeting, Tesoro reviewed in further detail with UDAQ the above permitting guidance showing that removal of the previous 705 tpy SO<sub>x</sub> limit on the FCCU is appropriate, because of the extensive physical changes to the FCCU that are separate from the 2007 Project.

## **Gasoline Loading Throughput Limit at the TLR**

As part of the Transport Loading Rack Expansion (1996), the Salt Lake City Refinery voluntarily accepted a loading rate limit of 450 million gallons per year of gasoline under Approval Order DAQE-378-96, now authorized under Approval Order DAQE-AN103350055-11. The loading rate limit was taken such that the project resulted in a net decrease in VOC emissions. With this application, Tesoro is requesting removal of the gasoline loading limit. Tesoro has projected that the gasoline loading rate may exceed 450 million gallons per year following the Project.

The Waxy Crude Processing Project involves physical changes at the refinery and will increase the gasoline product loaded out from the refinery. The physical changes associated with waxy crude processing were not envisioned as part of the Transport Loading Rack Expansion. Based on the regulatory principles described above for the FCCU SO<sub>x</sub> emissions limit, this Project is considered a separate modification from the Transport Loading Rack Expansion in 1996. The 450 million gallons per year throughput limit served its purpose for the original Rack Expansion project. The emissions increase associated with increasing the gasoline loading rate above the existing limit and pursuant to the Waxy Crude Processing Project is accounted for in this NSR analysis. Upon startup of the Project following completion of the second phase of construction, the existing gasoline throughput limit will no longer be an applicable requirement.

### **3.1.1.2 Baseline Actual Emissions**

“Baseline actual emissions” for an existing emissions unit are calculated as:

*“... the average rate, in tons per year, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 10-year period immediately preceding either the date the owner or operator begins actual construction of the project, or the date a complete permit application is received by the Administrator for a permit required under this section or by the reviewing authority for a permit required by a plan, whichever is earlier, except that the 10-year period shall not include any period earlier than November 15, 1990.”*

For baseline actual emissions, Tesoro has defined a 24-month baseline period specific to each NSR pollutant. Tesoro has considered emissions between January 1, 2008 and June 30, 2011, for all pollutants for its baseline emissions analysis. The 24-month baseline periods are chosen because they are considered the most representative of past and current capabilities of units being affected by this project for those pollutants (i.e., this time period is indicative of capabilities that exist today and could be utilized with variations in crude slate or intermediates). Refer to Attachment B for documentation of the baseline periods selected and the calculated baseline actual emissions.



As with projected actual emissions, baseline actual emissions shall include fugitive emissions and emissions associated with startups, shutdowns, and malfunctions.<sup>18</sup> The baseline emissions are adjusted downwards to remove non-compliant emissions that may have occurred during the 24-month baseline or emissions that would have exceeded a current emission limitation.<sup>19</sup> Tesoro has adjusted downward measured fuel gas H<sub>2</sub>S concentrations that exceeded the applicable emission limit under NSPS Subpart J, during certain startup, shutdown, and malfunction events during the baseline period.

Generally, baseline actual emissions are calculated according to the following hierarchy:

1. Continuous emission monitoring system (CEMS) data
2. Stack test results and measured process data
3. Standard emission factors from public sources and measured process data (i.e. EPA's AP-42)

The only exception to this hierarchy is for calculation of SO<sub>2</sub> emissions from the Cogeneration Unit. Tesoro operates an SO<sub>2</sub> CEMS at the stack to determine compliance with NSPS Subpart J for the fired HRSG duct burners and maintains this CEMS in accordance with Appendix B to 40 CFR 60. The concentration readings are typically less than 5 ppmv, and there is no exhaust gas flow meter. Tesoro calculated actual emissions using the CEMS data and a site-specific F-factor and compared those results to calculated emissions using the measured fuel gas H<sub>2</sub>S concentrations. The calculated actual emissions using the CEMS data were higher than the calculated actual emissions using the measured H<sub>2</sub>S concentrations, which would result in an inappropriately high baseline actual emission rate. Therefore, Tesoro has calculated the baseline actual emissions from the Cogeneration Unit based on the measured fuel gas H<sub>2</sub>S concentrations since this approach is conservative for purposes of determining PSD applicability.

### **3.1.2 Actual-to-Potential Test for New Emissions Units**

In 40 CFR 52.21(a)(2)(iv)(d), the actual-to-potential applicability test is described as the following:

*“(d) Actual-to-potential test for projects that only involve construction of a new emissions unit(s). A significant emissions increase of a regulated NSR pollutant is projected to occur if the sum of the difference between the potential to emit (as defined in paragraph (b)(4) of this section) from each new emissions unit following completion of the project and the baseline actual emissions (as defined in paragraph (b)(48)(iii) of this section) of these units before the project*

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<sup>18</sup> 40 CFR 52.21(b)(48)(ii)(a).

<sup>19</sup> 40 CFR 52.21(b)(48)(ii)(b)-(c).

*equals or exceeds the significant amount for that pollutant (as defined in paragraph (b)(23) of this section).”*

Terms within this paragraph that have specific definitions include “new emissions unit,” “potential to emit,” and “baseline actual emissions.” A “new emissions unit” is any part of a stationary source that emits any regulated NSR pollutant and is or will be newly constructed and has existed for less than two years from the date such emissions unit first operated.<sup>20</sup> A description of “potential to emit” and “baseline actual emissions” are as follows.

“Potential to emit” is defined as:<sup>21</sup>

*“... the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as part of its design if the limitation or the effect it would have on emissions is federally enforceable...”*

The potential to emit for an emissions unit yet to be constructed is generally calculated as the product of its hourly maximum throughput or heat input capacity and an uncontrolled emission factor, which may be from EPA documents (e.g., AP-42), a manufacturer performance guarantee, existing regulatory standards (e.g., a New Source Performance Standard), or from other information sources. Federally enforceable emission limitations on the capacity of the source to emit a pollutant (e.g., air pollution control equipment, restriction on hours of operation) may be taken to reduce the unit’s potential to emit.

The methodology in this section may also be applied to estimate maximum emissions from existing emission units to reduce post-project annual emission recordkeeping requirements.

### **3.1.3 The Netting Equation**

For an existing major source for all pollutants, if the project emissions increase of a regulated pollutant exceeds the NSR significant emission rate in Table 3-1, a netting analysis can be performed to identify creditable contemporaneous emission increases and decreases that have occurred at the refinery. The netting analysis is performed in three steps outlined as follows:

1. **Define Contemporaneous Period.** The contemporaneous period begins with the date five years prior to the estimated (or actual) date of start of construction and ends with the date the

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<sup>20</sup> 40 CFR 52.21(b)(7)(ii).

<sup>21</sup> 40 CFR 52.21(b)(4).

emissions increase from the particular change occurs. The term “contemporaneous” is described in more detail below.

2. **Identify Emission Increases/Decreases.** All creditable contemporaneous actual emission increases and decreases that were a result of physical changes or changes in the method of operation at the plant site are summed together.
3. **Calculate Net Emissions Increase.** The emission increases associated with the new modification (i.e., the Project) are added to the contemporaneous increases and decreases to determine the “net emissions increase”. If the net emissions increase for any pollutant exceeds the corresponding NSR significant emission rate, that pollutant is subject to the NSR preconstruction permitting requirements.

The contemporaneous emission changes that constitute the second part of the netting equation are also specifically defined and have several qualifiers. Under Federal PSD regulations, an emissions change is contemporaneous to a given project if it occurred within the five years preceding the start of construction of the project or if it will occur between the time construction commences and operation begins. This definition is straightforward. However, the second main qualifier is that the contemporaneous emissions change must be “creditable”. A contemporaneous emissions increase for a given pollutant is not creditable if that increase was previously relied upon in the issuance of a PSD permit. EPA guidance is clear that emissions increases or decreases of a given pollutant considered in netting a source out of PSD applicability for that pollutant are not “relied upon” and thus remain creditable for future netting analyses. An emissions increase is creditable to the extent that the new level of actual emissions exceeds the old. An emissions decrease is creditable only to the extent that 1) the old level of actual or allowable emissions, whichever is lower, exceeds the new level of actual emissions; 2) it is federally enforceable; and 3) it has approximately the same qualitative significance for public health and welfare as that attributed to the increase from the particular change.

### **3.2 Affected Units at the Salt Lake City Refinery**

All existing, non-modified emission units at the Salt Lake City Refinery were reviewed to determine if the project will result in an emissions increase. Units that will experience an emissions increase due to the project (i.e., be affected by the project) are presented in Table 3-2.

**Table 3-2. Summary of Affected Emission Units**

<b>Emission Unit</b>	<b>New / Existing</b>	<b>Modified / Non-modified</b>
Crude Unit Furnace H-101	Existing	Non-modified
UFU Furnace F-1	Existing	Non-modified
UFU Regeneration Heater F-15	Existing	Non-modified
FCCU/ CO Boiler	Existing	Modified
DDU Charge Heater F-680	Existing	Non-modified
DDU Rerun Reboiler F-681	Existing	Non-modified
Ultraformer Compressors K1s	Existing	Non-modified
Cooling Tower UU3	Existing	Modified
SRU/TGI	Existing	Non-modified
FGDU/SWS Flare	Existing	Non-modified
GHT Heater F-701	Existing	Non-modified
Cogeneration Unit CG1 and CG2	Existing	Non-modified
LPG Rack	Existing	Modified
Loading Rack	Existing	Non-modified
New/Replaced Components	Existing	Modified
Tanks 204, 212, 213, 242, 243, 252, 291, 321, 324, 325, 326, 327, 330, 331, 503, 504	Existing	Non-modified
Tank 188 (Black Wax Crude)	New	N/A
Tank 186 (Yellow Wax Crude)	New	N/A
DDU Reactor (vented to South Flare during SSM events)	New	N/A
VRU Vessels (vented to North Flare during SSM events)	New	N/A
New Benzene Control Equipment	New	N/A

### 3.3 Emission Units Not Impacted by Project

The following major units at the Salt Lake City Refinery will not experience increased utilization as a result of implementing the proposed project scope:

- South Flare (PS #7): The additional DDU Reactor will vent to the South Flare during SSM events. For purposes of the NSR analysis, these emissions are accounted for separately. The project does not otherwise result in an increase in emissions at the South Flare.
- North Flare (PS #8): The new VRU vessels will vent to the North Flare during SSM events. For purposes of the NSR analysis, these emissions are accounted for separately. The project does not otherwise result in an increase in emissions at the North Flare.
- Emergency/Standby Sources: Inherently not affected by changes in process rate.
- Cooling Tower UU2: No equipment in the UU2 cooling water system is being modified nor is the circulation rate increasing as part of the proposed Project.

### **3.4 Project Emissions Increase Summary**

Table 3-3 presents a summary of the Project emissions increase. The Project emissions increase are less than their respective NSR significant emission rates for NO<sub>x</sub>, CO, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, VOC, H<sub>2</sub>SO<sub>4</sub>, and the CO<sub>2</sub>e trigger level of 75,000 tpy., therefore the Project does not trigger NSR for these pollutants or GHGs. The project emissions increase is greater than the NSR significant emission rate for SO<sub>2</sub>. As a result, Tesoro has conducted a netting analysis to determine if the net emissions increase of SO<sub>2</sub> is greater than the significant emission rate, contained in Section 3.5.

**Table 3-3. Waxy Crude Processing Project Emissions Increases (tpy)**

<b>Emission Unit</b>	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>	<b>CO</b>	<b>PM</b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>VOC</b>	<b>H<sub>2</sub>SO<sub>4</sub></b>	<b>GHG (CO<sub>2</sub>e)</b>
Crude Unit Furnace H-101	0.00	0.00	0.06	0.00	0.00	0.00	0.10	0.00	1,161
FCCU/CO Boiler	24.93	116.51	6.93	5.70	4.90	3.89	0.00	6.72	39,826
Ultraformer Unit Furnace F-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
UFU Regeneration Heater F-15	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0
DDU Charge Heater F-680	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
DDU Rerun Reboiler F-681	0.46	0.00	0.61	0.15	0.15	0.15	0.04	0.00	0
SRU/TGI	0.24	0.00	0.20	0.02	0.02	0.02	0.01	0.00	0
FGDU/SWS (SRU) Flare	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	4
GHT Unit F-701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Ultraformer Compressors (K1s)	0.32	0.00	0.11	0.01	0.01	0.01	0.01	0.00	46
Cooling Tower UU3	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0
Cogeneration Unit Turbines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Cogeneration Unit HRSGs	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0
LPG Rack	0.01	0.00	0.00	0.00	0.00	0.00	0.67	0.00	37
Gasoline and Diesel Loadout	0.00	0.00	0.00	0.00	0.00	0.00	14.72	0.00	0
Storage Tanks	0.00	0.00	0.00	0.00	0.00	0.00	6.45	0.00	0
New and Replaced Components	0.00	0.00	0.00	0.00	0.00	0.00	5.19	0.00	0
DDU Reactor (SSM events)	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6
VRU Vessels (SSM events)	0.00	0.03	0.02	0.00	0.00	0.00	0.01	0.00	0
NESHAP Control System	0.93	0.07	0.78	0.07	0.07	0.07	0.84	0.00	0
<b>Project Emissions Increase (tpy)</b>	<b>27.15</b>	<b>131.71</b>	<b>8.86</b>	<b>9.05</b>	<b>6.57</b>	<b>4.15</b>	<b>28.12</b>	<b>6.87</b>	<b>41,080</b>
NSR significant emission rate (tpy)	40	40	100	25	15	10	40	7	75,000
Is Project Emissions Increase > SER?	No	Yes	No	No	No	No	No	No	No

### 3.5 PSD Netting Analysis

The following steps are performed in accordance with PSD netting requirements to determine if the net emissions increase of SO<sub>2</sub> is greater than the PSD significant emission rate (SER).

**Step 1: Determine the emissions increase from the proposed project only.**

The project emissions increase is summarized in Table 3-3. Netting analysis is only performed for SO<sub>2</sub> as it is the only pollutant with a project-related increase greater than the PSD SER.

**Step 2: Determine the contemporaneous period.**

The contemporaneous period begins on the date five years before construction commences on the proposed modification and ends on the date the emissions increase from the proposed modification occurs. Construction on the Waxy Crude Processing Project is expected to commence as early as April 1, 2012, therefore Tesoro is considering the contemporaneous period to begin on April 1, 2007.

**Step 3: Sum the emissions change to determine the net emissions increase. Compare the net emissions increase to the PSD significant emission rate.**

If the net emissions increase is less than the corresponding PSD significant emission rate, the project is not subject to PSD review. If the net emissions increase is greater than the corresponding PSD significant rate, the project is subject to PSD review.

See Table 3-4 for the contemporaneous project emission calculations. The list of contemporaneous projects was determined through a detailed review of all projects undertaken at the Salt Lake City Refinery since April 1, 2007. The increases in SO<sub>2</sub> emissions are conservatively based on permitted emission increases. Tesoro reserves the right to review these contemporaneous emission increases in the future.

**Table 3-4. Contemporaneous Project SO<sub>2</sub> Emissions and NSR Applicability (tpy)**

<b>Project Name</b>	<b>SO<sub>2</sub> Emissions Change (tpy)</b>	<b>Notes</b>
2007 FCU Reliability Project	+39.00	Project completed.
GHT Project	+19.24	Project completed.
BenSat Unit	+1.29	Unit under construction, startup will occur prior to May 1, 2012.
CONOx Project	--	See Section 2.5. The project is aggregated with the Waxy Crude Processing Project.
LPG Recovery Project	+0.003	Startup will occur prior to May 1, 2012.
UFU Scrubber	+0.05	Startup will occur prior to May 1, 2012.
FCCU Overhead Condensing Project	--	See Section 2.5. The project is aggregated with the Waxy Crude Processing Project.
Re-routing PDO to VRU	+1.84	Startup will occur prior to May 1, 2012.
SRU Tail Gas Unit	-259.39	Startup will occur prior to completion of the Project.
<b>Netting Analysis: Sum of Contemporaneous Creditable Increases and Decreases Excluding Project Emissions Increase (tpy)</b>	<b>-197.97</b>	
Project Emissions Increase (tpy)	131.71	See Table 3-3.
Net Emissions Increase [Project Emissions Increase + Netting Analysis CCI/CCD] (tpy)	-66.26	
NSR significant emission rate (tpy)	40	
<b>Is Net Emissions Increase Greater than NSR significant emission rate?</b>	<b>No</b>	

### 3.5.1 SRU Tail Gas Treatment Unit

As a separate contemporaneous project, Tesoro will install a tail gas treatment unit (TGTU) at its Sulfur Recovery Unit (SRU) to reduce SO<sub>2</sub> emissions. TGTUs are designed to convert additional sulfur compounds back into H<sub>2</sub>S for recovery as elemental sulfur.

As the first step in the TGTU, a new small electric heater will heat hot oil that will be used to preheat the SRU tail gas to the hydrogenation reactor. The heated gasses, along with hydrogen, are then



mixed and introduced to a hydrogenation reactor. In the reactor, all sulfur compounds will be reduced to H<sub>2</sub>S in an exothermic reaction. The gas will be cooled in a quench tower to a suitable temperature for amine treatment, and sour water is condensed from the stream. The gases will be compressed in a small blower, cooled, and routed to an amine absorber, and the treated gases will then be routed to the existing SRU Tail Gas Incinerator (TGI). The amine solution will be regenerated to release the absorbed acid gas which will be recycled to the SRU.

To accommodate the recycle gas from the TGTU, the existing undersized spare SRU air blower may be upgraded. Further, the TGTU will be installed such that gases may bypass the TGTU directly to the TGI in the event of a TGTU malfunction. To minimize emissions the TGTU will be designed for start-up prior to the SRU and shutdown following SRU shutdown.

### 3.6 PSD Applicability Determination

As previously noted, the Project emissions increase is less than the NSR significant emission rate for NO<sub>x</sub>, CO, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, VOC, H<sub>2</sub>SO<sub>4</sub>, and the CO<sub>2</sub>e trigger level, therefore the Project does not trigger NSR for those pollutants. The net emissions increase is less than the NSR significant emission rate for SO<sub>2</sub>; therefore the Project does not trigger NSR for SO<sub>2</sub>.

#### 3.6.1 “Reasonable Possibility” Requirements

On December 21, 2007, the US EPA promulgated updates to the federal PSD rules at 40 CFR 52.21(r)(6)(vi) that defines when an owner/operator of a major source is required to conduct recordkeeping and reporting when using the baseline-actual-to-projected-actual emissions increase calculation methodology. The Utah Air Quality Board has adopted the federal PSD rules as they existed in the Code of Federal Regulations on July 1, 2008, at R307-405.

A “reasonable possibility” occurs when the project is calculated to result in either:<sup>22</sup>

*“( a ) A projected actual emissions increase of at least 50 percent of the amount that is a “significant emissions increase,” as defined under paragraph (b)(40) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR pollutant; or*

*( b ) A projected actual emissions increase that, added to the amount of emissions excluded under paragraph (b)(41)(ii)( c ) of this section, sums to at least 50 percent of the amount that is a “significant emissions increase,” as defined under paragraph (b)(40) of this section (without reference to the amount that is a significant net emissions increase), for the regulated NSR*

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<sup>22</sup> 40 CFR 52.21(r)(6)(vi)( a )-( b )

*pollutant. For a project for which a reasonable possibility occurs only within the meaning of paragraph (r)(6)(vi)( b ) of this section, and not also within the meaning of paragraph (r)(6)(vi)( a ) of this section, then provisions (r)(6)(ii) through (v) do not apply to the project.”*

A summary of reasonable possibility applicability and requirements is shown in Table 3-5 below. Tesoro is required to complete a preconstruction determination (i.e., pre-project recordkeeping) for NO<sub>x</sub>, SO<sub>2</sub>, CO, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, and H<sub>2</sub>SO<sub>4</sub>. Tesoro is also required to keep records of post-project annual actual emissions of NO<sub>x</sub>, SO<sub>2</sub>, VOC, and H<sub>2</sub>SO<sub>4</sub>. The project emissions increase of CO<sub>2</sub>e is less than 75,000 tpy trigger level; therefore, GHG is not a regulated NSR pollutant for this project. Since GHG is not a regulated NSR pollutant for the project, reasonable possibility recordkeeping requirements do not apply.

**Table 3-5. Summary of Reasonable Possibility Applicability and Requirements**

	<b>NO<sub>x</sub></b>	<b>SO<sub>2</sub></b>	<b>CO</b>	<b>PM</b>	<b>PM<sub>10</sub></b>	<b>PM<sub>2.5</sub></b>	<b>VOC</b>	<b>H<sub>2</sub>SO<sub>4</sub></b>	<b>GHG (CO<sub>2</sub>e)</b>
Project Emission Increase (tpy)	27.15	131.71	8.86	9.05	6.57	4.15	28.12	6.87	N/A
Demand Growth Exclusion (tpy)	29.71	73.06	85.44	49.95	44.47	37.68	2.72	4.41	
Project Emission Increase + Demand Growth Exclusion (tpy)	56.86	204.77	94.30	59.00	51.04	41.83	30.85	11.28	
PSD Significant Emission Rate (SER) (tpy)	40	40	100	25	15	10	40	7	
Is Project Emission Increase Greater than 1/2 of the PSD Significant Emission Rate?	<b>Yes</b>	<b>Yes</b>	No	No	No	No	<b>Yes</b>	<b>Yes</b>	
Is Project Emission Increase + Demand Growth Exclusion Greater than 1/2 of the PSD Significant Emission Rate?	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	
Is Preconstruction Determination Required?	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	
Is Recordkeeping of Annual Actual Emissions Required?	<b>Yes</b>	<b>Yes</b>	No	No	No	No	<b>Yes</b>	<b>Yes</b>	

The preconstruction requirements are as follows:<sup>23</sup>

*“(i) Before beginning actual construction of the project, the owner or operator shall document and maintain a record of the following information:*

*( a ) A description of the project;*

*( b ) Identification of the emissions unit(s) whose emissions of a regulated NSR pollutant could be affected by the project; and*

*( c ) A description of the applicability test used to determine that the project is not a major modification for any regulated NSR pollutant, including the baseline actual emissions, the projected actual emissions, the amount of emissions excluded under paragraph (b)(41)(ii)( c ) of this section and an explanation for why such amount was excluded, and any netting calculations, if applicable.”*

This applicability analysis satisfies the preconstruction requirements. Beyond these preconstruction requirements, monitoring of future actual calendar-year annual emissions is required as described below.<sup>24</sup>

*“(iii) The owner or operator shall monitor the emissions of any regulated NSR pollutant that could increase as a result of the project and that is emitted by any emissions unit identified in paragraph (r)(6)(i)( b ) of this section; and calculate and maintain a record of the annual emissions, in tons per year on a calendar year basis, for a period of 5 years following resumption of regular operations after the change, or for a period of 10 years following resumption of regular operations after the change if the project increases the design capacity or potential to emit of that regulated NSR pollutant at such emissions unit.”*

Post-project recordkeeping of NO<sub>x</sub>, SO<sub>2</sub>, VOC, and H<sub>2</sub>SO<sub>4</sub> emissions from the existing emissions units affected by the project, and from which projected actual emission calculations are used in the preconstruction determination, is required to be maintained. Tesoro will keep records of annual actual emissions of these pollutants following resumption of regular operations after the change, consistent with 40 CFR 52.21(r)(6).

As described in Section 2.4, the project will be constructed in two major phases for constructability purposes. There will be an interim period after the first phase of construction is completed and prior to the second phase of construction. The reasonable possibility post-project recordkeeping requirements do not apply in the interim period during construction of the second phase, since this Project is considered a single modification under NSR regulations. A significant SO<sub>2</sub> emission increase following the first phase of construction will not occur regardless of whether the TGTU is

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<sup>23</sup> 40 CFR 52.21(r)(6)(i)

<sup>24</sup> 40 CFR 52.21(r)(6)(iii)

installed. In order to confirm that a significant emission increase will not occur if the TGTU is not installed after the first phase and before completion of the second phase, Tesoro shall track its 12-month rolling SO<sub>2</sub> emissions from the emission units affected by the Project beginning from the date that regular operations resume after completion of the first phase until the date that regular operations begin following the second phase of construction. Tesoro will compare these interim 12-month rolling actual emissions to the annual emissions that the affected units were capable of accommodating during the baseline period as shown in Table 3-6 below. Emissions from the SRU Flare will not be included since it is only considered an affected emission unit as a result of installing the TGTU, which is scheduled to occur in the second construction phase.

**Table 3-6. Summary of SO<sub>2</sub> Emissions that Project-Impacted Emission Units are Capable of Accommodating**

<b>Emission Units</b>	<b>SO<sub>2</sub> (tpy)</b>
Crude Unit Furnace H-101	5.54
FCCU/CO Boiler	645.38
Ultraformer Unit Furnace F-1	5.16
UFU Regeneration Heater F-15	0.30
DDU Charge Heater F-680	1.01
DDU Rerun Reboiler F-681	0.84
SRU/TGI	399.42
FGDU/SWS (SRU) Flare	0.37
GHT Unit F-701	0.28
Ultraformer Compressors (K1s)	0.01
Cooling Tower UU3	N/A
Cogeneration Unit Turbines	0.63
Cogeneration Unit HRSGs	6.47
LPG Rack	N/A
Gasoline and Diesel Loadout	N/A
Storage Tanks	N/A
New and Replaced Components	N/A
DDU Reactor (SSM events)	0.00
VRU Vessels (SSM events)	0.00

Emission Units	SO <sub>2</sub> (tpy)
NESHAP Control System	0.00

N/A = Not Applicable (Units do not emit SO<sub>2</sub>)

The reasonable possibility regulations are not completely clear with respect to treatment/inclusion of new emissions units. The provisions of (r)(6) apply only to existing emission units. It does not appear that future actual annual emissions recordkeeping would be required or allowed. However, as noted above, PSD applicability is inherently considered a project-wide determination and some representation of all project-affected emission units may be necessary for Tesoro's annual review of actual emissions. In an abundance of caution, Tesoro will maintain records of future actual calendar-year annual emissions from all emissions units affected by the project, regardless of whether the actual-to-projected-actual or actual-to-potential emissions calculation methodology is employed in the preconstruction determination.

Tesoro is required to review its actual emissions annually as follows:<sup>25</sup>

*“(v) If the unit is an existing unit other than an electric utility steam generating unit, the owner or operator shall submit a report to the Administrator if the annual emissions, in tons per year, from the project identified in paragraph (r)(6)(i) of this section, exceed the baseline actual emissions (as documented and maintained pursuant to paragraph (r)(6)(i)(c) of this section), by a significant amount (as defined in paragraph (b)(23) of this section) for that regulated NSR pollutant, and if such emissions differ from the preconstruction projection as documented and maintained pursuant to paragraph (r)(6)(i)(c) of this section. Such report shall be submitted to the Administrator within 60 days after the end of such year. The report shall contain the following:*

- (a) The name, address and telephone number of the major stationary source;*
- (b) The annual emissions as calculated pursuant to paragraph (r)(6)(iii) of this section; and*
- (c) Any other information that the owner or operator wishes to include in the report (e.g., an explanation as to why the emissions differ from the preconstruction projection). ”*

Tesoro will review its future calendar-year actual emissions, beginning with the first calendar year after issuance of the AO, to determine if the actual emissions exceed the baseline actual emissions by a significant amount. If this occurs, it will also differ from the preconstruction projected as documented in this applicability analysis. In this event, Tesoro will submit a report within 60 days after the end of the calendar year.

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<sup>25</sup> 40 CFR 52.21(r)(6)(v)

## 4.0 Regulatory Applicability and Compliance Demonstration

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In addition to the PSD analysis detailed in Section 3.0, Tesoro has completed an applicability review of all other Federal and State air quality regulations as part of the air permit application process.

Table 4-1 provides a summary of the major air quality programs that were reviewed for the project.

Each regulation which requires explanation is described in the following sections. Certain aspects of the Project result in the triggering of new applicable requirements.

**Table 4-1. Summary of Air Quality Regulatory Applicability for the Project**

<b>Report Section</b>	<b>Program Description</b>	<b>Regulatory Citation</b>	<b>Does This Project Trigger New Applicable Requirements?</b>
---	National Ambient Air Quality Standards (NAAQS)	40 CFR 50	No
3.0	New Source Review (NSR)	40 CFR 52	No
4.1	New Source Performance Standards (NSPS)	40 CFR 60	Yes
4.2	National Emission Standards for Hazardous Air Pollutants (NESHAPs)	40 CFR 61	Yes
4.2	NESHAPs for Source Categories	40 CFR 63	Yes
---	Risk Management Programs for Chemical Accidental Release Prevention	40 CFR 68	No
---	Title V Operating Permit	40 CFR 70	No
---	Acid Rain Requirements	40 CFR 72	No
---	Stratospheric Ozone Protection Requirements	40 CFR 82	No
---	<b>Utah State Rules</b>	<b>UAC R307</b>	---
4.1	Stationary Sources	R307-210	Yes
4.2	National Emission Standards for Hazardous Air Pollutants	R307-214	Yes
4.3	Ozone Nonattainment and Maintenance Areas: Control of Hydrocarbon Emissions in Petroleum Refineries	R307-326	No
4.4	Ozone Nonattainment and Maintenance Areas: Petroleum Liquid Storage	R307-327	No
4.5	Permit: New and Modified Sources	R307-401	Yes
4.6	Nonattainment and Maintenance Areas	R307-403	No
4.7	Permits: Major Sources in Attainment or Unclassified Areas (PSD)	R307-405	No

<b>Report Section</b>	<b>Program Description</b>	<b>Regulatory Citation</b>	<b>Does This Project Trigger New Applicable Requirements?</b>
4.8	Visibility	R307-406	No
4.9	Permits: Emissions Impact Analysis	R307-410	No
---	Permits: Fees for Approval Orders	R307-414	No
4.10	Permits: Ozone Offset Requirements in Davis and Salt Lake Counties	R307-420	No
4.11	Permits: PM <sub>10</sub> Offset Requirements in Salt Lake County and Utah County	R307-421	No
4.12	Consent Decree	---	No
4.13	Approval Orders	---	No

## 4.1 R307-210: Stationary Sources

New Source Performance Standards (NSPS) are incorporated by reference into the UDAQ regulations. Applicability and compliance with Subparts Db, Dc, J/Ja, Kb, GGGa, NNN, and QQQ are discussed below in additional detail. Regulatory coverage for other subparts currently applicable to the facility (Subparts K, Ka, GG, and GGG as listed in Section III of the AO) will not change as a result of this project.

### 4.1.1 Subpart Db: Standards of Performance for Industrial-Commercial-Institutional Steam Generating Units

The affected facility to which Subpart Db applies is each steam generating unit, defined as a device that combusts any fuel or byproduct/waste and produces steam or heats any heat transfer medium, that commences construction, reconstruction, or modification after June 19, 1984, and has a heat input capacity greater than 100 MMBtu/hr. The CO Boiler is a steam generating unit that has not been constructed, reconstructed, or modified since June 19, 1984, and is therefore not currently subject to Subpart Db. The CO Boiler will not be modified or reconstructed as part of this Project. Therefore, this project does not trigger Subpart Db.

### 4.1.2 Subpart Dc: Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Tesoro is proposing to add a convection section to the DDU process heaters (F-680 and F-681). In addition, the heaters will be changed from a single pass to a dual pass furnace design. The DDU Charge Heater F-680 is not a steam generating unit since it is used primarily to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst and therefore meets the definition of a “process heater” under Subpart Db. The physical changes to the



DDU Rerun Reboiler (F-681) do not increase in the maximum heat input capacity, and therefore do not result in an emission increase. Installation of the convection system is not a modification as defined under 40 CFR §60.14(a).

The project is not a reconstruction of the DDU Rerun Reboiler (F-681) since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facilities. The total cost of the project is estimated to be \$875,000. The total replacement cost is estimated to be \$6.5 million for the heater. The cost of the project is only 13% of the replacement value.

#### **4.1.3 Subparts J/Ja: Standards of Performance for Petroleum Refineries**

This project involves changes to the following units subject to Subpart Ja: FCCU/CO Boiler, the SRU, and the DDU Heaters F-680 and F-681. The applicability to Subpart Ja and compliance with Subparts J/Ja are described for each unit below.

##### **4.1.3.1 FCCU/CO Boiler**

In accordance with 40 CFR 60.100a, a new, modified, or reconstructed fluid catalytic cracking units is considered an affected facility subject to the NSPS Subpart Ja requirements. The NSPS regulation, at 40 CFR §60.14(a), defines a modification as a physical or operational change to the affected facility that is not specifically exempted and that results in an increase in the emissions rate to the atmosphere of any pollutant to which a standard applies (i.e., for NSPS Subpart Ja, SO<sub>2</sub>, CO, PM, and NO<sub>x</sub> for an FCCU). The physical or operational changes that are specifically exempted from being considered a modification are listed at 40 CFR §60.14(e). “Increase in emissions rate” in turn is defined pursuant to 40 CFR §60.14(b) as an increase in the maximum hourly emission rate of an applicable pollutant (“the NSPS Causality Test”) from the affected facility.

In accordance with definition fluid catalytic cracking at 40 CFR 60.101a, the FCCU affected facility includes the follows:

*“ . . . the riser, reactor, regenerator, air blowers, spent catalyst or contact material stripper, catalyst or contact material recovery equipment, and regenerator equipment for controlling air pollutant emissions and for heat recovery. When fluid catalyst cracking unit regenerator exhaust from two separate fluid catalytic cracking units share a common exhaust treatment (e.g., CO boiler or wet scrubber), the fluid catalytic cracking unit is a single affected facility.”*

The wet gas compressor at the VRU is not included within this definition of the FCCU affected facility under Subpart Ja. It is located downstream of the FCCU fractionator, which is located downstream of the FCCU reactor. Thus, the wet gas compressor is not part of the FCCU affected facility under Subpart Ja.

Because the compressor is not a part of the affected facility, the replacement of the compressor is not considered as part of the NSPS applicability determination.<sup>26</sup> In addition, the VRU work will result in an increase in the FCCU production capacity without a capital expenditure at the affected facility. Therefore, the work is therefore excluded from being considered a physical or operational change to the FCCU per 40 CFR §60.14(e)(2).

The “increase in emissions rate” associated with a given modification must take into account the project’s affects on emissions from the combined operation of both the FCCU and the CO Boiler. To determine if the changes will result in an emissions rate increase, the operation (i.e., capacity) of the FCCU/CO Boiler prior to and following the modification must be defined. For purposes of this analysis, based upon EPA policy the following basis was used to define the FCCU/CO Boiler operations prior to and following the proposed changes planned for the project:

- The FCCU is assumed to be operating at its maximum capacity and most economic operation for a given fresh feed.
- The CO Boiler is assumed to be operating at their maximum physical capacity as defined by their supplemental firing rate.

Any operating parameters that may affect the mass emissions rate are assumed held constant to the maximum degree feasible (i.e., fresh feed characteristics, CO concentration in the FCCU overhead gas to the CO Boiler, operating rate of the wet gas compressor at the VRU).

The only changes to the affected facility are related to the FCCU riser upgrades. The riser upgrades do not increase the design feed rate to the FCCU. Simulations have confirmed that the maximum coke burn rate may decrease due to the increased residence time. The riser upgrades are being implemented to increase residence time and to increase the value of the product slate from the FCCU. The FCCU is currently constrained by maximum riser temperature due to cracking concerns in the winter, which will not be relieved by the proposed FCCU riser upgrades. During the summer, the FCCU is currently constrained by the wet gas compressor at the VRU downstream from the FCCU affected facility. Increases in production at the FCCU as a result of this Project are a result of the wet gas compressor upgrade at the VRU, which does not factor into this analysis.

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<sup>26</sup> i.e., ADI Control Number 0800044; 9/7/88 letter from EPA Region 11 to Mobil Oil Corporation.

The project will not increase the amount of sulfur (in the coke) deposited on the catalyst. The project will also not increase the amount of reduced nitrogen compounds in the FCCU overhead gas. Since there are no increases in the design rates of coke burn or gas firing, there are no increases in the potential hourly emissions of PM, CO, NO<sub>x</sub>, or SO<sub>2</sub>.

Tesoro also considered a scenario where a decrease in coke burn rate occurs at the FCCU's maximum feed rate. A decrease in coke burn would result in a higher required firing rate at the CO Boiler to maintain the destruction efficiency and steam production rate. Firing of additional fuel gas in the CO Boiler results in less NO<sub>x</sub> emissions since NO<sub>x</sub> formation from the reduced nitrogen compounds is greater than NO<sub>x</sub> formation from fuel gas firing. Similarly, emissions of PM, CO, and SO<sub>2</sub> from fuel gas firing are less than from coke burning. For these reasons, the Project is not an NSPS modification.

The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facility. The total cost of the FCCU riser portion of the project is estimated to be \$20 million. The replacement cost of the facility was estimated to be \$89.6 million in 2008. The cost of the project is only 22 percent of the replacement value.

Tesoro will continue to comply with Conditions II.B.2.d-f based on NSPS Subpart J, which requires that emissions of SO<sub>x</sub> shall not exceed 9.8 lb/1,000 lb coke burned on a seven day average. Tesoro will continue to comply with the monitoring requirements listed in Condition II.B.2.d.1, including limits on sulfur content in the feed, temperature of the FCCU regenerator, oxygen content of the FCCU regenerator, CO concentration in the FCCU regenerator, and CO emissions to the atmosphere. These limits were established under a range of full and partial burn operating conditions as part of an approved Alternative Monitoring Plan.

The CO Boiler is currently subject to Subpart J and is not subject to Subpart Ja as a fuel gas combustion device. The Project is not a modification or reconstruction of the CO Boiler as defined in 40 CFR 60.14 since there are no proposed physical changes to the unit; therefore, the CO Boiler will not become subject to Subpart Ja as a result of this project.

#### **4.1.3.2 Sulfur Recovery Unit**

Physical changes will be made to the SRU affected facility as part of the Project, including installation of a TGTU. There will be no increase in the maximum hourly emission rate of SO<sub>2</sub> as a result of the Project, therefore the project is not a modification under NSPS Ja. In addition, the design capacity will continue to be less than 20 long tons per day following changes made at the unit.

The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the replacement cost of the facilities. The total cost of the project is estimated to be \$12.4 million. The total replacement cost is estimated to be \$33.4 million for the affected facility. The cost of the project is 37 percent of the replacement value, less than the 50 percent threshold.

#### **4.1.3.3 DDU Heaters**

While a new convection section will be added to the existing F-680 and F-681 process heaters and the will change from a single pass to dual pass furnace design, the design duty will not be increasing. Thus, the heaters will not experience an emissions increase and as such will not be modified under NSPS Ja.

The project is not a reconstruction since the fixed capital cost of the project is less than 50 percent of the current replacement cost of the facilities. The total cost of the project is estimated to be \$875,000. The total replacement cost is estimated to be \$13 million for the two heaters. The cost of the project is only 7 percent of the replacement value.

#### **4.1.4 Subpart Kb: Standards of Performance for Volatile Organic Liquid Storage Vessels for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984**

The replacement Tank 188 will be subject to NSPS Subpart Kb since its volume will be greater than 151 m<sup>3</sup> and the maximum true vapor pressure is greater than 3.5 kilopascals (0.5 psia). Tesoro will comply with the emission standards, testing, monitoring, recordkeeping, and reporting requirements of the rule.

The new Tank 186 crude storage tank will be subject to NSPS Subpart Kb since its volume will be greater than 151 m<sup>3</sup> and the maximum true vapor pressure is greater than 3.5 kilopascals (0.5 psia). Tesoro will comply with the emission standards, testing, monitoring, recordkeeping, and reporting requirements of the rule.

#### **4.1.5 Subpart GGGa: Standards of Performance for Equipment Leaks of VOC in Petroleum Refineries for Which Construction, Reconstruction, or Modification Commenced After November 7, 2006**

Applicability of the process fugitive components and the wet gas compressor to Subpart GGGa are discussed below.

#### **4.1.5.1 Process Fugitive Components**

Process fugitive components in VOC service at the Salt City Refinery are subject to NSPS Subpart VV pursuant to MACT Subpart CC. The overlap conditions in at 40 CFR 63.140(p) state the following:

*“(p) Overlap of subpart CC with other regulations for equipment leaks. After the compliance dates specified in paragraph (h) of this section equipment leaks that are also subject to the provisions of 40 CFR parts 60 and 61 are required to comply only with the provisions specified in this subpart.”*

This condition may be interpreted that the process units which will add and replace components as a result of the Project (including the FCCU, VRU, DDU, Crude Unit, TGTU, CO Boiler, Wastewater, LPG Loading, Alkylolation, Dewaxing), which contain components in organic HAP service, cannot be subject to Subpart GGGa regardless of changes made in the units. Due to the current uncertainty in applying this overlap provision to regulatory applicability under Subpart GGGa, Tesoro has considered applicability of Subpart GGGa under the modification provisions under 40 CFR 60.14, which require that the physical change results in an emissions increase at the affected facility, which is calculated at maximum capacity before and after the change. The affected facility in this case is the sum of all equipment (components) at each of the affected units.

While exact component counts on a unit by unit basis are not currently available, the total number of components added is not expected to result in triggering a modification under NSPS Subparts GGGa/VVa, Tesoro is assuming that the changes to the affected process units will not trigger modification under Subpart GGGa/VVa. Tesoro will review this assumption when detailed drawings are made available. In the event that modification is triggered under Subpart GGGa/VVa, Tesoro will provide updated information to UDAQ.

#### **4.1.5.2 Wet Gas Compressor**

Compressors are a separate affected facility under Subpart GGGa. Tesoro is replacing its wet gas compressor at the VRU. The new wet gas compressor is therefore subject to Subpart GGGa. Tesoro will comply with the provisions of this subpart.

#### **4.1.6 Subpart NNN: Standards of Performance for Volatile Organic Compound (VOC) Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Distillation Operations**

Subpart NNN of 40 CFR 60 applies to distillation units in the SOCMI industry that process organic chemicals as a product, co-product, by-product, or intermediate. The affected facility for a

“distillation unit” includes the distillation column, reboilers, associated condensers, and the vent recovery system.

As part of this Project, distillation units will experience a physical change. Tesoro is presuming that the distillation units, which will undergo modification as defined by §60.14(b) of Subpart A, and will become subject to Subpart NNN. Tesoro reserves the right to re-examine applicability under §60.14 with UDAQ.

Tesoro proposes to comply with the monitoring, reporting and recordkeeping requirements of Subpart NNN via an alternative monitoring plan (AMP), which closely mirrors the standards of 40 CFR 60 Subpart RRR – Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry (SOCMI) Reactor Processes. The EPA has already approved several AMPs for similarly affected distillation units producing propane and butane at other petroleum refineries throughout the United States. Tesoro expects to request approval of an AMP prior to completion of the changes.

#### **4.1.7 Subpart QQQ: Standards of Performance for VOC Emissions from Petroleum Refinery Wastewater Systems**

At this time, detailed design drawings are not available for wastewater system modifications related to the Project. Tesoro is uncertain at this time whether a modification to an affected facility will occur as part of the Project. Tesoro will review the detailed drawings when they are available and in the event that modification is triggered under Subpart QQQ, Tesoro will provide the required notifications to UDAQ.

#### **4.1.8 New Source Performance Standards for Greenhouse Gases**

On December 21, 2010, the US EPA signed an agreement with a number of organizations that requires EPA to sign a proposed rule by December 10, 2011 that includes standards of performance for GHGs for affected facilities at refineries. EPA has since delayed the release of the proposed rule. Tesoro will review regulatory applicability with these future rules for potentially affected facilities that commence construction, modification, or reconstruction after the effective date. Because the actual time frame and content of the upcoming rulemaking is unknown, Tesoro cannot state for certain if new or modified units associated with this project will trigger the new standards.

## **4.2 R307-214: National Emission Standards for Hazardous Air Pollutants**

MACT and NESHAP standards are incorporated by reference into the UDAQ rules. Each currently applicable standard relevant to the Project is discussed below.

### **4.2.1 40 CFR 61 Subpart FF: National Emission Standard for Benzene Waste Operations**

Tesoro is evaluating if this Project will increase the total annual benzene (TAB) quantity to greater than 10 megagrams per year. If triggered, Tesoro will comply with the 6BQ option of Subpart FF.

### **4.2.2 40 CFR 63 Subpart CC: National Emission Standards for Hazardous Air Pollutants from Petroleum Refineries**

Tesoro will continue to comply with Subpart CC at its existing emission units. The replacement Tank 188 and the new Tank 186 will be subject to Subpart CC. Tanks which are subject to NSPS Subpart Kb are required to comply only with the requirements of NSPS Subpart Kb under the overlap provisions in §63.640(n).

The new and replaced components will also be subject to requirements under Subpart CC.

### **4.2.3 40 CFR 63 Subpart UUU: National Emission Standard for Hazardous Air Pollutants for Petroleum Refineries: Catalytic Cracking Units, Catalytic Reforming Units, and Sulfur Recovery Units**

The FCCU and SRU are currently subject to 40 CFR 63 Subpart UUU. Tesoro will continue to comply with the emission standards and other requirements of this rule. The FCCU and SRU will not be reconstructed as part of this project.

Tesoro is installing a new bypass line at the FCCU. Tesoro will comply with the requirements of Subpart CC for the new bypass line.

### **4.2.4 40 CFR 63 Subpart EEEE: National Emission Standard for Hazardous Air Pollutants: Organic Liquids Distribution (Non-gasoline)**

Tesoro has evaluated the regulatory applicability of 40 CFR 63 Subpart EEEE “National Emission Standards for Hazardous Air Pollutants: Organic Liquids Distribution (Non-Gasoline)” to the new Black Wax and Yellow Wax crude unloading rack. Subpart EEEE applies to an “organic liquids distribution (OLD) operation” which is defined as:

*“... the combination of activities and equipment used to store or transfer organic liquids into, out of, or within a plant site regardless of the specific activity being performed. Activities include, but are not limited to, storage, transfer, blending, compounding, and packaging.”*

The definition of “organic liquid” includes “any crude oils downstream of the first point of custody transfer.” Black Wax and Yellow Wax crudes are organic liquids by this definition.

The affected source under Subpart EEEE is the “collection of activities and equipment used to distribute organic liquids into, out of, or within a facility that is a major source of HAP.” The source is composed of certain equipment: storage tanks, transfer racks, equipment leaks, transport vehicles, and containers. However, under §63.2338(c), if the equipment is “part of an affected source under another 40 CFR part 63 national emission standards for hazardous air pollutants (NESHAP),” then it is excluded from the affected source under Subpart EEEE. The Tesoro refinery is subject to 40 CFR 63 Subpart CC, which covers the equipment otherwise regulated by Subpart EEEE except for unloading racks, since Subpart CC regulates loading rack emissions (i.e., gasoline loading rack, marine tank vessel loading operations) but not equipment that involves unloading organic liquids. This is consistent with an ODEQ determination from January 2011 for a similar project at Holly Refining.<sup>27</sup>

The new Black Wax and Yellow Wax crude unloading rack is considered a “transfer rack” which is defined as:

*“... a single system used to load organic liquids into, or unload organic liquids out of, transport vehicles or containers. It includes all loading and unloading arms, pumps, meters, shutoff valves, relief valves, and other piping and equipment necessary for the transfer operation. Transfer equipment and operations that are physically separate (i.e., do not share common piping, valves, and other equipment) are considered to be separate transfer racks.”*

The unloading rack is exempt from all requirements under Subpart EEEE pursuant to §63.2343 other than documentation as follows:

*“This section establishes the notification, recordkeeping, and reporting requirements for emission sources identified in §63.2338 that do not require control under this subpart (i.e., under paragraphs (a) through (e) of §63.2346). Such emission sources are not subject to any other notification, recordkeeping, or reporting sections in this subpart, including §63.2350(c), except as indicated in paragraphs (a) through (d) of this section.*

*(a) For each storage tank subject to this subpart having a capacity of less than 18.9 cubic meters (5,000 gallons) and for each transfer rack subject to this subpart that only unloads organic liquids*

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<sup>27</sup> [ftp://www.deq.state.ok.us/DEQ%20Public/AQD/Issued\\_Permits/2007XXX/2007005-a14.doc](ftp://www.deq.state.ok.us/DEQ%20Public/AQD/Issued_Permits/2007XXX/2007005-a14.doc)



*(i.e., no organic liquids are loaded at any of the transfer racks), you must keep documentation that verifies that each storage tank and transfer rack identified in paragraph (a) of this section is not required to be controlled. The documentation must be kept up-to-date (i.e., all such emission sources at a facility are identified in the documentation regardless of when the documentation was last compiled) and must be in a form suitable and readily available for expeditious inspection and review according to §63.10(b)(1), including records stored in electronic form in a separate location. The documentation may consist of identification of the tanks and transfer racks identified in paragraph (a) of this section on a plant site plan or process and instrumentation diagram (P&ID)."*

Therefore, maintaining documentation that the transfer rack only unloads organic liquids serves as compliance with Subpart EEEE. No other notifications or compliance obligations are required for this NESHAP.

#### **4.2.5 40 CFR 63 Subpart DDDDD: Boiler MACT**

On March 21, 2011, EPA issued final standards for industrial, commercial, and institutional boilers and process heaters (Boiler MACT). However, on May 16, 2011, EPA administrator Lisa Jackson signed an action delaying the effective date of the rule until an undetermined future date. On December 2, 2011, EPA proposed amendments to the rule. Tesoro will comply with Boiler MACT as applicable for affected process heaters following the final issuance of the rule.

### **4.3 R307-326: Ozone Nonattainment and Maintenance Areas: Control of Hydrocarbon Emissions in Petroleum Refineries**

Rule R307-326 requires control of various VOC sources at petroleum refineries. Tesoro will comply with the provisions of this rule by:

1. Venting the DDU reactor to a flare during process unit turnarounds, and
2. Monitoring leaks from existing, new, and replacement fugitive components.

A bypass of the CO Boiler will be installed routing gases from the FCCU regenerator to a new quench system and then to the ESP, bypassing the CO Boiler. The quench system will be used to control the temperature of the gas stream to maintain ESP performance. This bypass would be used in the event of issues at the CO Boiler requiring maintenance and/or shutdown. Tesoro requests approval to install and operate this bypass since Tesoro would not comply with R307-326-7 during these bypass events.

### **4.4 R307-327: Ozone Nonattainment and Maintenance Areas: Petroleum Liquid Storage**

Rule R307-207 requires tanks with a capacity greater than 40,000 gallons that are used to store volatile petroleum liquids with a true vapor pressure greater than 1.52 psia to be fitted with control

equipment. Black Wax crude has a true vapor pressure of 1.21 psia at storage conditions (180 °F). Yellow Wax crude has an estimated maximum true vapor pressure of 6.74 psia at the expected storage temperature (180 °F).

Yellow Wax crude may be stored in either Tank 186 or the replacement Tank 188. Tesoro will comply with the control requirements of the rule for those tanks.

## **4.5 R307-401: Permit: New and Modified Sources**

Rule R307-401-3(b) requires submittal of an NOI to “make modifications or relocate an existing installation which will or might reasonably expected to increase the amount or change the effect of, or the character of, air contaminants discharged, so that such installation may be expected to become a source or indirect source of air pollution.” The Project may increase the amount of air contaminants discharge from multiple emission units. Rule R307-401-5 requires submittal of an NOI, which must contain specific information related to the process, nature of emissions, control device(s), and regulatory applicability and compliance. Refer to Section 5.0 for a summary of compliance with the NOI requirements.

### **4.5.1 BACT**

Rule 307-401-5(d) permits the issuance of an approval order if it is determined that the pollution control for emissions is at least best available control technology (BACT). A BACT review is required for new emission units and existing emission units where there is a physical modification and an increase in emissions.

Tesoro has conservatively considered BACT for the FCCU for emissions of particulate ( $PM_{10}/PM_{2.5}$ ),  $NO_x$ , and  $SO_2$  since there is expected to be an increase in actual emissions associated with the Project. A BACT analysis was recently conducted (2007) for the FCCU as part of the minor modifications to the FCCU to improve reliability (N0335-028). Continued operation of the ESP was selected as BACT for particulate emissions. The use of additional necessary  $SO_x$  reducing catalyst to meet NSPS limits was selected as BACT for  $SO_2$  emissions. Additional  $NO_x$  control equipment would not be economically feasible; therefore Tesoro will continue to comply with its  $NO_x$  emission limit. Tesoro proposes to continue using these control technologies as BACT for the FCCU.

Tesoro proposes to install a TGTU at the SRU to reduce facility  $SO_2$  emissions. Tesoro considers the TGTU to be BACT for  $SO_2$  emissions from the SRU.

Tesoro will install an internal floating roof on the replacement Tank 188 and the new Tank 186 to reduce VOC emissions.

The Cooling Tower UU3 has a drift eliminator rated at 0.005% and the VOC emissions will be controlled to comply with heat exchange system requirements under 40 CFR 63 Subpart CC.

## **4.6 R307-403: Nonattainment and Maintenance Areas**

R307-403 applies to major new sources or major modifications to be located in a nonattainment area.

The proposed project is neither a new major source nor a major modification as defined in R307-101-2 since the actual emissions increase is less than the significant emission rate (SER) thresholds. Refer to Section 3.6 for a summary of this determination.

### **4.6.1 R307-403-5: Offsets: PM<sub>10</sub> Nonattainment Area**

Emission offsets are required if the combined allowable emission increase of PM<sub>10</sub>, SO<sub>2</sub>, and NO<sub>x</sub> exceeds 25 tons per year. Refer to Section 4.13.1 for discussion of the changes in potential emissions as a result of the Project. The combined allowable emission increase from the project is zero (0) tons per year since the SIP caps will not increase. Therefore, no emission offsets are required.

## **4.7 R307-405: Permits: Major Sources in Attainment or Unclassified Areas (PSD)**

This project is not a major modification and is not subject to the PSD program as described in Section 3.0. Refer to Section 3.6 for a summary of this determination. Tesoro has demonstrated compliance with all applicable requirements with the submission of this NOI. Therefore the requirements of R307-405 are not applicable to this proposed project.

## **4.8 R307-406: Visibility**

This project is not a new major source or a major modification; therefore the provisions of this rule are not applicable.

## **4.9 R307-410: Permits: Emissions Impact Analysis**

Pursuant to R307-410-4, dispersion modeling is required for increases in the total controlled emission rate of attainment pollutants (NO<sub>x</sub> and CO for the SLC refinery) in an amount greater or equal to values given in Table 1 of the rule. For these pollutants, the thresholds given in Table 1 are equal to the SERs. Dispersion modeling is not required since the increases in emissions of NO<sub>x</sub> and CO are less than the SERs.

#### 4.9.1 R307-410-5: Ambient Air Impacts for Hazardous Air Pollutants

The requirements of R307-410-5 do not apply to installations which are subject to or are scheduled to be subject to an emission standard promulgated under 42 USC 7412 at the time the NOI is submitted. As described in Section 4.2, the FCCU, SRU, Tank 188, and new components are all subject to standards under 40 CFR 63 Subparts CC or UUU. The requirements of R307-410-5 do not apply to the project.

Actual HAP emission increases associated with the project include coke burn emissions, fuel gas combustion emissions, storage tank emissions, and gasoline loadout emissions. Table 4-2 presents a summary of actual HAP emission increases. There are no increases in potential emissions of HAPs as a result of the project. Refer to Attachment B for detailed HAP emission calculations.

**Table 4-2. Project Actual HAP Emissions Increase Summary**

<b>HAP</b>	<b>Project Actual Emissions Increase lb/yr</b>
Acetaldehyde	27.77
Acrolein	1.52
Benzene	479.26
Biphenyl	0.87
1,3-Butadiene	7.02E-02
Dichlorobenzene	1.52
Ethylbenzene	18.38
Formaldehyde	94.76
Hexane	2,660.74
Isopropyl benzene	0.00E+00
Naphthalene	191.40
Phenol	16.29
Toluene	822.06
1,2,4-Trimethylbenzene	51.54
2,2,4-Trimethylpentane	102.23
Xylenes	475.26
POM	0.95
Antimony	1.25
Arsenic	0.34
Beryllium	0.12
Cadmium	1.39
Chromium	2.05
Cobalt	1.00
Lead	0.49
Manganese	9.54
Mercury	0.33

<b>HAP</b>	<b>Project Actual Emissions Increase lb/yr</b>
Nickel	42.35
Selenium	3.17
Hydrochloric Acid	2,432.39
Carbon disulfide	0.84
Hydrogen cyanide	1,349.29
<b>Total</b>	<b>8,789.17</b>

#### **4.10 R307-420: Permits: Ozone Offset Requirements in Davis and Salt Lake Counties**

The SLC Refinery is located in a maintenance area for ozone. Emission offsets are required for any new major source or major modification of VOC or NO<sub>x</sub>. The project is neither a new major source nor a major modification for VOC or NO<sub>x</sub>, therefore offsets are not required.

#### **4.11 R307-421: Permits: PM<sub>10</sub> Offset Requirements in Salt Lake County and Utah County**

Emission offsets are required if the combined allowable emission increase of SO<sub>2</sub> and NO<sub>x</sub> exceeds 25 tons per year. The combined allowable emission increase from the project is zero (0) tons per year as described in Section 4.13.1. Therefore, no emission offsets are required.

#### **4.12 Consent Decree - United States, et.al. v. BP Exploration & Oil, et. al., Civil Action No. 2:96 CV 095 RL**

On August 29, 2001 BP Exploration entered into a Consent Decree with the US EPA covering eight refineries including the Salt Lake City and Mandan refineries. When Tesoro purchased the Salt Lake and Mandan refineries from BP, Tesoro assumed responsibility for the provisions of the consent decree as they related to the two facilities. This project is not being undertaken to comply with any provisions of the consent decree. Tesoro will continue to comply with the provisions of the consent decree after implementation of the project.

#### **4.13 Approval Order**

Tesoro will continue to comply with the conditions of its issued Approval Orders (DAQE-AN0103350051-11 for the refinery and DAQE-AN103350055-11 for the transport loading rack). Facility potential emissions are addressed in Section 4.13.1 and demonstration of compliance with the emission caps (Conditions II.A.20-22) in Section 4.13.2.

#### **4.13.1 Changes in Potential Emissions**

There will be an increase in PTE of SO<sub>2</sub> at the FCCU as a result of the Project. The FCCU is a member of the emission cap in Condition II.A.20. Tesoro is not proposing any increase in the emission cap, and will continue to comply with the cap as described in Section 4.13.2 below. There will be no increase in PTE at any other existing emission unit affected by the Project.

Installation of the new emission units (replaced Black Wax crude Tank 188, new Yellow Tank 186, the new DDU reactor, new VRU vessels, and the NESHAP control system) at the refinery will result in an increase in potential emissions. Potential emissions from the DDU reactor and VRU vessels are negligible (<0.1 tons per year of each criteria pollutant). Tesoro requests that the NESHAP control system be included in the NO<sub>x</sub>, SO<sub>2</sub>, and PM<sub>10</sub> SIP caps. Potential emissions of the new units are shown on Table 3-3.

#### **4.13.2 Compliance with Emission Caps**

Tesoro is subject to emission caps for SO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>10</sub> per Conditions II.A.20-22. A summary of projected emissions after the Project in comparison with these emission caps is presented in Table 4-3. It is important to note that the PM<sub>10</sub> emissions cap was added based on only filterable PM<sub>10</sub> emissions, therefore the calculations provided in this NOI are not consistent with the method of compliance demonstration. For gas combustion, an emission factor of 7.6 lb/MMscf per AP-42 is used instead of 5 lb/MMscf per the Approval Order. For the FCCU, condensable emissions make up 48.77 tons of the total projection. Taking these factors into account, the total projected filterable PM<sub>10</sub> emissions are 62.3 tpy. Tesoro will continue to comply with the SO<sub>2</sub>, NO<sub>x</sub>, and PM<sub>10</sub> emission caps.

**Table 4-3. Compliance with Refinery Emission Caps**

<b>Source</b>	<b>SO<sub>2</sub> Projected Emissions (tpy)</b>	<b>NO<sub>x</sub> Projected Emissions (tpy)</b>	<b>PM<sub>10</sub> Projected Emissions (tpy)</b>	<b>Filterable PM<sub>10</sub> Projected Emissions (tpy)</b>
Crude Unit Furnace H-101	4.50	22.89	4.37	2.88
FCCU/CO Boiler	761.89	174.00	96.55	47.79
Ultraformer Unit Furnace F-1	3.53	53.04	3.44	2.26
UFU Regeneration Heater F-15	0.22	2.79	0.21	0.14
DDU Charge Heater F-680	0.50	4.27	0.49	0.32
DDU Rerun Reboiler F-681	0.67	5.43	0.65	0.43
GHT Unit F-701	0.14	1.31	0.13	0.09
Ultraformer Compressors (K1s)	0.01	15.77	0.38	0.25
Cogeneration Unit Turbines	0.61	83.18	7.77	5.11
Cogeneration Unit HRSGs	4.68	41.63	4.55	3.00
<b>Total Emissions</b>	<b>777</b>	<b>404</b>	<b>118.6</b>	<b>62.3</b>
<b>Emission Cap</b>	<b>1,637</b>	<b>598</b>	<b>95.3<sup>A</sup></b>	<b>95.3</b>

<sup>A</sup> The PM<sub>10</sub> cap is based on calculations of only filterable PM<sub>10</sub>. The PM<sub>10</sub> emission calculations in this application include both filterable and condensable PM<sub>10</sub> as required by federal PSD regulations.

## 4.14 Summary and Conclusions

A summary of the regulatory conclusions in this Notice of Intent is as follows:

- The Project is not a major modification under NSR since the project emissions increases of NO<sub>x</sub>, CO, PM, PM<sub>10</sub>, PM<sub>2.5</sub>, VOC, H<sub>2</sub>SO<sub>4</sub>, are less than the significant emission rates, the CO<sub>2e</sub> level is less than the trigger, and the net emission increase of SO<sub>2</sub> is less than the significant emission rate.

- Tesoro is required to keep records of post-project actual emissions of NO<sub>x</sub>, SO<sub>2</sub>, VOC, and H<sub>2</sub>SO<sub>4</sub>.
- The Project does not include any modifications or reconstructions of existing units as defined under NSPS Subparts Db, Dc, Ja, or GGGa.
- A modification under NSPS Subpart NNN for distillation columns will occur, and Tesoro will submit an AMP to comply with the regulation.
- The new Tank 188 and the new Tank 186 will be subject to NSPS Subpart Kb and MACT Subpart CC.
- Tesoro may construct new benzene control equipment to comply with 40 CFR 61 Subpart FF.
- Tesoro is subject to 40 CFR 63 Subpart EEEE at its Black Wax and Yellow Wax crude unloading facility, and will comply by maintaining records that the rack will only unload organic liquids.
- Tesoro is requesting an emission limit of 12.0 tons VOC per year on Tank 291.
- Tesoro is requesting removal of the current SO<sub>x</sub> emission limit at the FCCU and the gasoline loading limit at the TLR.



## 5.0 Summary of NOI Requirements for Project

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Table 5-1 provides a summary of how this NOI complies with the specific requirements of Rule R307-401-5(2). Refer to Attachment E for a copy of Form 1 and an NOI Checklist including references to required information.

**Table 5-1. Summary of NOI Requirements**

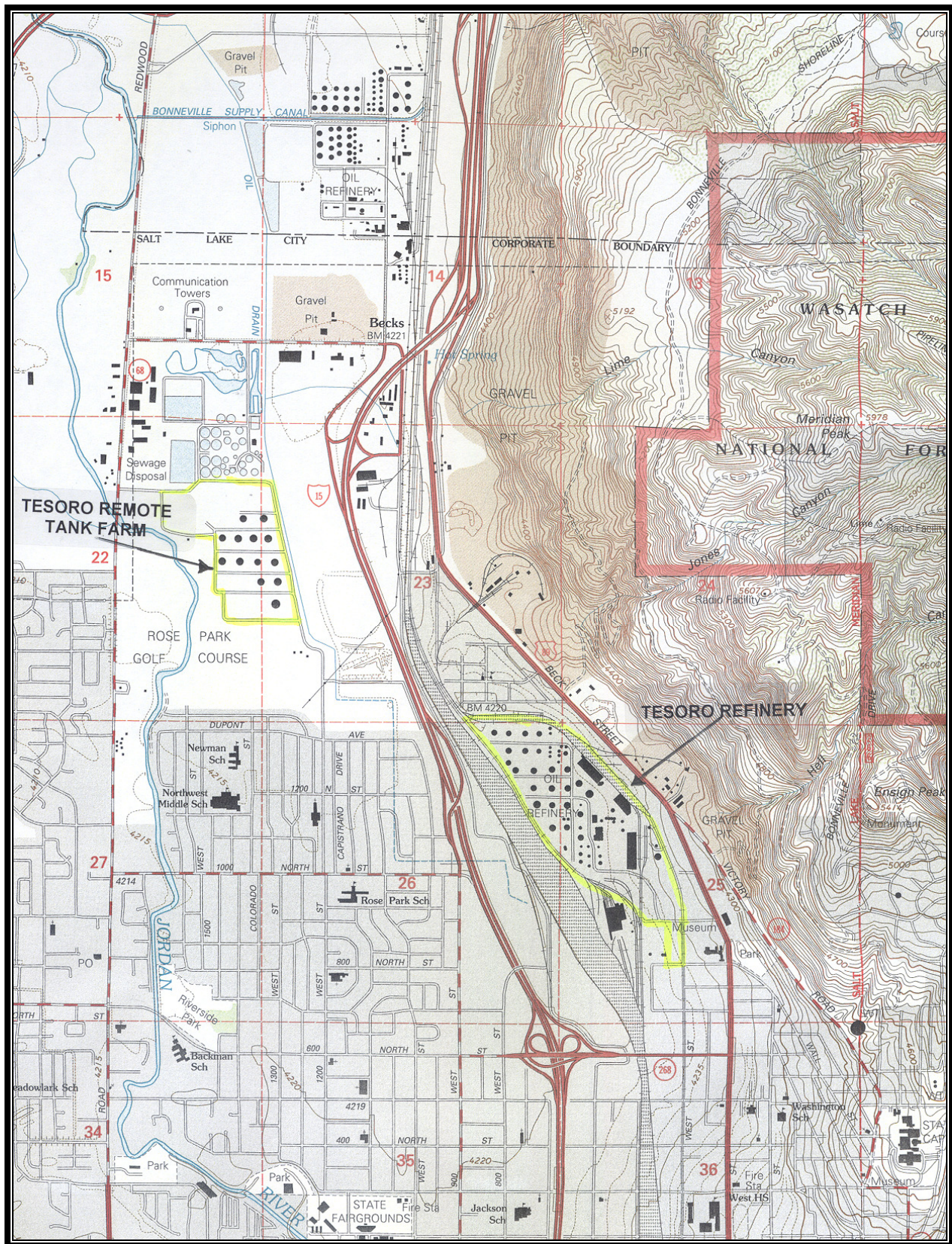
<b>Requirement</b>	<b>Section Reference for Information Provided</b>
(a) A description of the nature of the processes involved; the nature, procedures for handling and quantities of raw materials; the type and quantity of fuels employed; and the nature and quantity of finished product.	Section 2.0
(b) Expected composition and physical characteristics of effluent stream both before and after treatment by any control apparatus, including emission rates, volume, temperature, air contaminant types, and concentration of air contaminants.	Attachment B for emission rates.
(c) Size, type and performance characteristics of any control apparatus.	Section 2.0
(d) An analysis of best available control technology for the proposed source or modification. When determining best available control technology for a new or modified source in an ozone nonattainment or maintenance area that will emit volatile organic compounds or nitrogen oxides, the owner or operator of the source shall consider EPA Control Technique Guidance (CTG) documents and Alternative Control Technique documents that are applicable to the source. Best available control technology shall be at least as stringent as any published CTG that is applicable to the source.	Section 4.5.1
(e) Location and elevation of the emission point and other factors relating to dispersion and diffusion of the air contaminant in relation to nearby structures and window openings, and other information necessary to appraise the possible effects of the effluent.	Attachment A – location provided – other info not needed since modeling is not required.
(f) The location of planned sampling points and the tests of the completed installation to be made by the owner or operator when necessary to ascertain compliance.	Not applicable – no new testing is necessary to demonstrate compliance.

<b>Requirement</b>	<b>Section Reference for Information Provided</b>
(g) The typical operating schedule.	Section 2.0
(h) A schedule for construction.	Section 2.4
(i) Any plans, specifications and related information that are in final form at the time of submission of notice of intent.	No plans or specifications are in final form at the time of this submission.
(j) Any additional information required by: (i) R307-403, Permits: New and Modified Sources in Nonattainment Areas and Maintenance Areas; (ii) R307-405, Permits: Major Sources in Attainment or Unclassified Areas (PSD); (iii) R307-406, Visibility; (iv) R307-410, Emissions Impact Analysis; (v) R307-420, Permits: Ozone Offset Requirements in Davis and Salt Lake Counties; (vi) R307-421, Permits: PM10 Offset Requirements in Salt Lake County and Utah County.	(i) Section 4.6  (ii) Section 4.7  (iii) Section 4.8 (iv) Section 4.9 (v) Section 4.10  (vi) Section 4.11
(k) Any other information necessary to determine if the proposed source or modification will be in compliance with Title R307.	Refer to Section 4.0 for a complete analysis.

## **Attachment A**

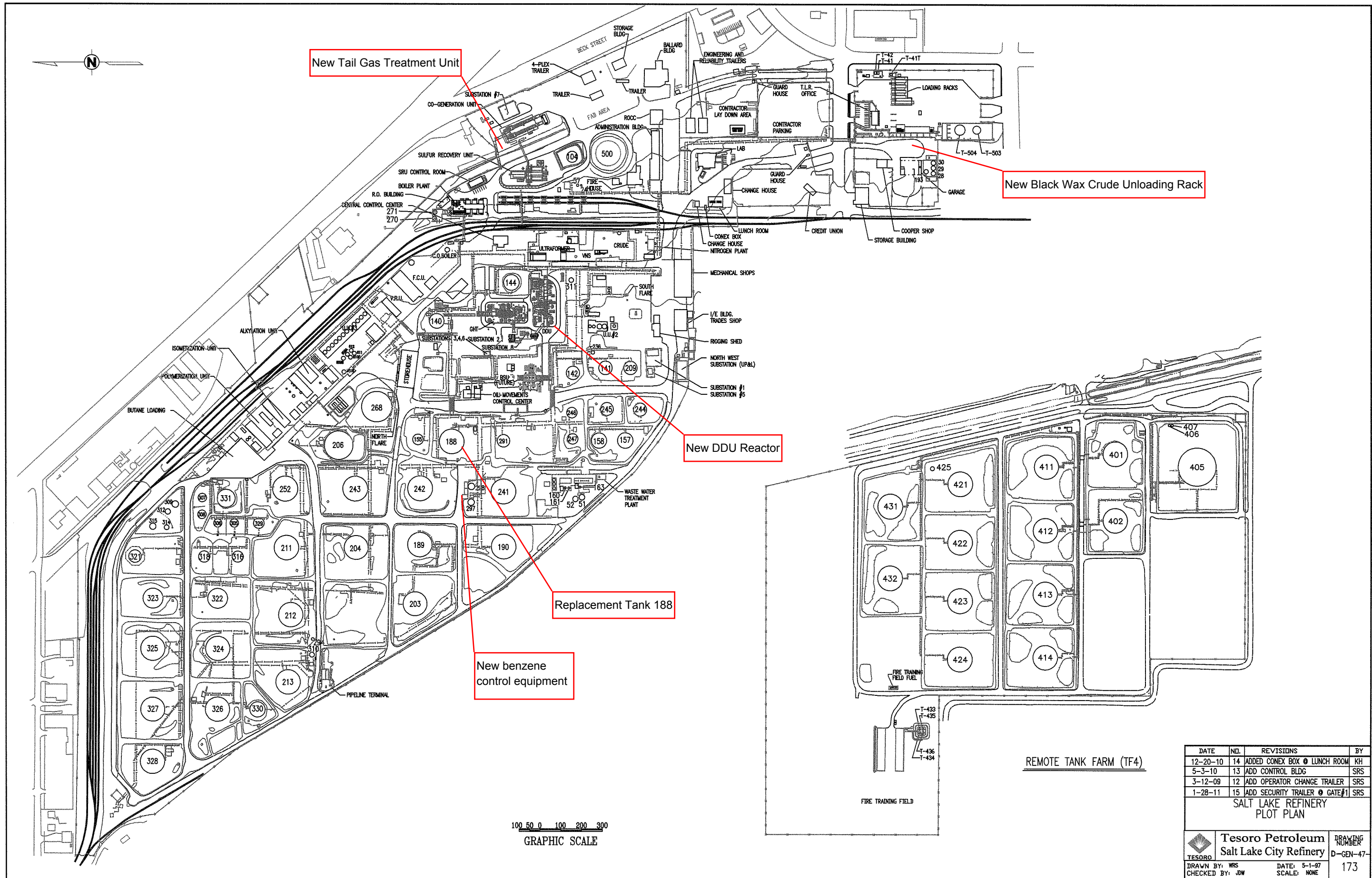
### **Site Diagram**





**Figure A-1**  
**Refinery Location Map**





DATE	NO.	REVISIONS	BY
12-20-10	14	ADDED CONEX BOX @ LUNCH ROOM	KH
5-3-10	13	ADD CONTROL BLDG	SRS
3-12-09	12	ADD OPERATOR CHANGE TRAILER	SRS
1-28-11	15	ADD SECURITY TRAILER @ GATE#1	SRS
SALT LAKE REFINERY PLOT PLAN			
Tesoro Petroleum Salt Lake City Refinery			DRAWING NUMBER
DRAWN BY: WRS CHECKED BY: JOW			D-GEN-47- 173
DATE: 5-1-97 SCALE: NONE			

## **Attachment B**

### **Emission Calculations**

## **List of Tables (Following Text)**

Attachment B-1: Baseline Actual Emission Calculations for Crude Unit Furnace H-101  
Attachment B-2: Projected Actual Emission Calculations for Crude Unit Furnace H-101  
Attachment B-3: Baseline Actual Emission Calculations for FCCU/CO Boiler  
Attachment B-4: Projected Actual Emission Calculations for FCCU/CO Boiler  
Attachment B-5: Baseline Actual Emission Calculations for Ultraformer Unit Furnace F-1  
Attachment B-6: Projected Actual Emission Calculations for Ultraformer Unit Furnace F-1  
Attachment B-7: Baseline Actual Emission Calculations for UFU Regeneration Heater  
Attachment B-8: Projected Actual Emission Calculations for UFU Regeneration Heater  
Attachment B-9: Baseline Actual Emission Calculations for DDU Charge Heater F-680  
Attachment B-10: Projected Actual Emission Calculations for DDU Charge Heater F-680  
Attachment B-11: Baseline Actual Emission Calculations for DDU Rerun Reboiler F-681  
Attachment B-12: Projected Actual Emission Calculations for DDU Rerun Reboiler F-681  
Attachment B-13: Baseline Actual Emission Calculations for SRU/TGI  
Attachment B-14: Projected Actual Emission Calculations for SRU/TGI  
Attachment B-15: Baseline Actual Emission Calculations for FGDU/SWS (SRU) Flare  
Attachment B-16: Projected Actual Emission Calculations for FGDU/SWS (SRU) Flare  
Attachment B-17: Baseline Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701  
Attachment B-18: Projected Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701  
Attachment B-19: Baseline Actual Emission Calculations for Ultraformer Compressors (K1s)  
Attachment B-20: Projected Actual Emission Calculations for Ultraformer Compressors (K1s)  
Attachment B-21: Baseline Actual Emission Calculations for Cooling Tower UU3  
Attachment B-22: Projected Actual Emission Calculations for Cooling Tower UU3  
Attachment B-23: Baseline Actual Emission Calculations for Cogeneration Unit Turbines  
Attachment B-24: Projected Actual Emission Calculations for Cogeneration Unit Turbines  
Attachment B-25: Baseline Actual Emission Calculations for Cogeneration Unit HRSGs  
Attachment B-26: Projected Actual Emission Calculations for Cogeneration Unit HRSGs  
Attachment B-27: Baseline and Projected Actual Emission Calculations for Gasoline and Diesel Loadout  
Attachment B-28: Baseline Actual Emission Calculations for LPG Loading Rack  
Attachment B-29: Projected Actual Emission Calculations for LPG Loading Rack  
Attachment B-30: Emission Increase Calculations for Storage Tanks  
Attachment B-31: Potential Emission Calculations for Process Components  
Attachment B-32: Potential Emission Calculations for DDU Reactor (Venting to South Flare)  
Attachment B-33: Potential Emission Calculations for New VRU Vessels (Venting to North Flare)  
Attachment B-34: Potential Emission Calculations for NESHAP Control System

Attachment B-35: Sum of Historical Actual Monthly Emissions for Affected Units

Attachment B-36: Calculation of 24-month Rolling Average Emissions

Attachment B-37: Netting Calculation Table

Attachment B-38: PSD Applicability Determination and Reasonable Possibility Requirements

Attachment B-39: Summary of Compliance with Emission Caps

Attachment B-40: HAP Emission Increase Summary

Attachment B-41: Stack HAP Emission Calculations for Coke Burn

Attachment B-42: Stack HAP Emission Calculations for Fuel Gas Combustion

Attachment B-43: HAP Emission Calculations for Loadout Increases

Attachment B-44: HAP Emission Calculations for Tanks Increases



Emission calculations for each regulated NSR pollutant were completed for all new emission units and existing, non-modified emission units that are associated with the Waxy Crude Processing Project. Section B.1 summarizes the calculations of potential emissions for new emission units associated with the Project. Section B.2 summarizes the actual-to-projected-actual for existing emission units that are associated with the Project. Refer back to Section 3.4 for a comparison of the project emissions increase to the NSR significant emission rates.

## **B.1 Emissions from New Equipment**

Emission calculations for the replacement Tank 188, new Tank 186, new DDU reactor, new VRU vessels, and new and replaced fugitive components in VOC service are described below. Refer to the attached tables for details of these calculations.

### **B.1.1 Tank 188 (Black Wax Crude)**

The potential emissions from the replacement Tank 188 are calculated using EPA's TANKS 4.09d software. Final design information is not available, therefore the number of fittings have been estimated using TANKS 4.09d default values. One roof landing is also included in the unit's potential-to-emit since landings for inspections are required once per ten year time period.

### **B.1.2 Tank 186 (Yellow Wax Crude)**

The potential emissions from the new Tank 186 are calculated using EPA's TANKS 4.09d software. Final design information is not available, therefore the number of fittings have been estimated using TANKS 4.09d default values. One roof landing is also included in the unit's potential-to-emit since landings for inspections are required once per ten year time period.

### **B.1.3 DDU Reactor (Vented to South Flare during SSM Events)**

The new DDU reactor will be vented to the South Flare during startup, shutdown, and malfunction events. To estimate these emissions, it is assumed that all gases contained in the reactor would be vented once per year. The composition of the gases vented is estimated using the refinery's hydrogen gas stream composition.

### **B.1.4 VRU Vessels (Vented to North Flare during SSM Events)**

The new VRU vessels will be vented to the North Flare during startup, shutdown, and malfunction events. These vessels replace existing vessels at the VRU and will have larger dimensions, resulting in an increase in potential emissions during startup, shutdown, and malfunction events. To estimate

these emissions, it is assumed that all gases contained in the new vessels would be vented once per year. The composition of the gases vented is estimated using the simulated stream composition.

### **B.1.5 New Benzene Control System**

Tesoro is evaluating whether additional controls will be required to treat the wastewater to control benzene. Several options are being evaluated for benzene control and the appropriate technology will be selected to meet benzene limits in the wastewater. Tesoro is considering an air stripper followed by either carbon absorption or thermal oxidation. Tesoro has conservatively considered both control options in the project emission calculations. Emissions from thermal oxidation are worst-case since they include combustion emissions and a higher overall exhaust flow rate from the combustion gases.

## **B.2 Emissions from Modified and Non-Modified Existing Emission Units**

The general methodology for determining projected actual emissions for the existing emission units affected by the project is described below. Although Tesoro has calculated increases in actual emissions from existing emission units, this permit application does not request an increase in the current allowable emissions at any of the existing emission units affected by this project.

### **B.2.1 Process Heaters**

Multiple existing process heaters are expected to experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2 for each affected process heater. The affected process heaters include the following:

- Crude Unit Furnace H-101
- UFU Furnace F-1
- UFU Regeneration Heater F-15
- DDU Charge Heater F-680
- DDU Rerun Reboiler F-681
- GHT Heater F-701

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of expected operation are those factors used to represent current emissions, with changes to the fuel gas characteristics as appropriate. Fuel gas characteristics are estimated consistent with the description in

Section 2.3; heating value and carbon content are calculated using the projected fuel gas composition, and H<sub>2</sub>S content is estimated as the sum of the average and one standard deviation of monthly averages during the baseline period.

Emissions that the process heaters were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors generally consistent with those used for the projected emissions. The exception is that the CO<sub>2</sub>e emission factor for all process heaters is based on the calculated maximum monthly CO<sub>2</sub>e emission factor during the baseline period. This emission factor is lower than what is used for the projected emissions due to the changes in fuel gas composition.

### **B.2.2 FCCU/CO Boiler**

The FCCU/CO Boiler will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated generally consistent with the methodology described in Section 3.1.1.2, with the exception of condensable PM emissions. On December 1, 2010, EPA revised Method 202 for measuring condensable PM emissions. The modifications to Method 202 were designed to reduce the formation of sulfate artifacts (SO<sub>3</sub>, SO<sub>4</sub>) through contact and retention of SO<sub>2</sub> in the condensable PM impinger train when the combustion products of sulfur-bearing fuels are passed through water. The revised Method 202 is intended to increase the precision of the method and improve consistency in the measurements. Use of the condensable PM emission factors from measurements using the old Method 202 would have resulted in overestimation of baseline actual emissions in comparison with projected actual emissions. Tesoro completed four engineering tests in April and May of 2011 using the revised Method 202 to develop an updated condensable PM emission factor of 0.98 lb/MMscf exhaust gas, and applied this factor throughout the baseline period. These results are summarized in Attachment B-4.

Calculation of sulfuric acid mist emissions are based on measured SO<sub>2</sub> emissions, conversion of SO<sub>2</sub> to SO<sub>3</sub>, and conversion of SO<sub>3</sub> to H<sub>2</sub>SO<sub>4</sub>. Conversion of SO<sub>2</sub> to SO<sub>3</sub> is estimated based on Permit Condition II.B.3.d.1, which states that SO<sub>3</sub> is equal to 5% of the measured SO<sub>2</sub> emissions based on previous stack test results. Conversion of SO<sub>3</sub> to H<sub>2</sub>SO<sub>4</sub> is based on a correlation obtained from a September 1964 article from the American Institute of Chemical Engineering (AIChE) Journal, which is dependent on stack temperature and moisture content. At stack conditions, the calculated conversion rate is 94.2%.

Projected emissions are calculated based on (1) coke burn rate, (2) exhaust flow rate, and (3) CO Boiler firing rate expected following startup of the Project and emission factors representative of expected operation. Tesoro prepared these projections considering the full range of operating conditions, including either partial or full burn modes of operation. Emission factors representative of expected operation are generally based on emissions during the baseline period:

- NO<sub>x</sub> and CO concentrations in the exhaust are estimated based on expected operational parameters.
- SO<sub>2</sub> emissions are based on the average emission factor (lb/1,000-lb coke burn) observed during the baseline period.
- PM<sub>10</sub> emissions are based on the results of a 7/7/2011 stack test. This is the most recent compliance test and is conservative compared to the engineer tests completed in April and May of 2011.
- PM and PM<sub>2.5</sub> emissions are based on the 7/7/2011 PM<sub>10</sub> stack test results and a particle size distribution developed from four engineering tests completed in April and May of 2011. The particle size distribution showed that filterable PM<sub>10</sub> emissions are 75% of filterable PM emissions, and PM<sub>2.5</sub> emissions are 44% of filterable PM emissions.
- VOC emissions are based on EPA's AP-42 emission factor for natural gas firing and the projected CO Boiler firing rate.
- H<sub>2</sub>SO<sub>4</sub> emissions are based on the projected SO<sub>2</sub> emissions, conversion of 5% of SO<sub>2</sub> to SO<sub>3</sub>, and the calculated conversion of 94.2% of the SO<sub>3</sub> to H<sub>2</sub>SO<sub>4</sub>.
- CO<sub>2</sub>e emissions are calculated based on CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O emission factors from the EPA GHG Mandatory Reporting Rule, 40 CFR 98, Subpart Y. Global warming potentials for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O are from Table A-1 of 40 CFR 98.

Emissions that the FCCU/CO Boiler was capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

### **B.2.3 Ultraformer Compressors (K1s)**

The Ultraformer Compressors (K1s) will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. The expected future firing rate is based on a typical hourly firing rate and conservatively assuming 8,760 hours of operation. Emission factors representative of expected operation are those factors used to represent current emissions.

Emissions that the Ultraformer Compressors (K1s) were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

#### **B.2.4 Cooling Tower UU3**

The Cooling Tower UU3 will experience an increase in emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Tesoro has measured VOC content in its cooling water since November 2009 using EPA Method 21. Tesoro used the average measured VOC content to estimate VOC emissions prior to November 2009.

Average annual conductivity measurements are used to represent total dissolved solids concentration for calculation of PM emissions. A particle size distribution is estimated based on “Calculating Realistic PM10 Emissions from Cooling Towers,” Reisman and Frisbie, Proceedings of 2001 A&WMA ACE.

Projected emissions are calculated based on the projected cooling water circulation rate following changes to the cooling water lines. VOC content will be restricted after the effective date of new requirements for heat exchange systems (October 29, 2012) under 40 CFR 63 Subpart CC. Total dissolved solids content is estimated using the maximum annual average content during the baseline period.

Emissions that the Cooling Tower UU3 was capable of accommodating during the baseline period are calculated using the actual operating rate during the baseline period (8,760 hours per year at the design circulation rate), and emission factors consistent with those used for the projected emissions.

#### **B.2.5 Sulfur Recovery Unit/ Tail Gas Incinerator (SRU/TGI)**

The SRU/TGI will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Emissions from the unit are a function of the sulfur feed rate, sour gas flow, and fuel gas firing at the TGI.

A decrease in emissions of SO<sub>2</sub> will occur due to installation of the TGTU. Tesoro is proposing an enforceable emission limitation of 60 tpy SO<sub>2</sub> on a 12-month rolling sum basis to make this reduction enforceable for purposes of the netting analysis. The emission calculation methodology for SO<sub>2</sub> is therefore the baseline actual-to-potential methodology.

Projected emissions of all other pollutants are calculated based on annual firing rate and sour gas flow rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of current operation are those factors used to represent expected emissions.

Emissions that the SRU/TGI were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate and sour gas flow rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions. This quantity is not calculated for SO<sub>2</sub> emissions because emissions that could have been accommodated during the baseline period cannot be excluded when using the baseline actual-to-potential emission calculation methodology.

#### **B.2.6 FGDU/SWS (SRU) Flare**

The FGDU/SWS (SRU) Flare will experience an increase in utilization as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2. Emissions from the unit are a function of the total acid gas and sour gas flow vented to the flare.

Projected emissions of all other pollutants are calculated based on an estimate of flaring events expected following startup of the Project. The sour gas flow rate during flaring events is estimated based on the largest recent flaring event, which occurred in 2002. Tesoro conservatively assumes that two of these events (totaling 22.2 hours/year) could occur in a calendar year following startup of the Project. Installation of the TGTU is not expected to result in additional malfunctions at the SRU since malfunctions at the TGTU would not cause a shutdown at the SRU.

Emissions that the SRU Flare were capable of accommodating during the baseline period are calculated using 2009 actual emissions.

### **B.2.7 Cogeneration Unit Turbines**

The Cogeneration Unit Turbines will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of current operation are those factors used to represent expected emissions. The turbines fire natural gas and amine absorber gas, for which the compositions are not expected to change as a result of the project. Fuel heating value and carbon content are calculated using the average gas composition during the baseline period. Amine absorber gas H<sub>2</sub>S content is estimated using the average of available sampling data.

Emissions that the Cogeneration Unit Turbines were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors consistent with those used for the projected emissions.

### **B.2.8 Cogeneration Unit HRSGs**

The Cogeneration Unit HRSGs will experience an increase in firing rate and emissions as a result of the Project. Baseline actual emissions are calculated consistent with the methodology described in Section 3.1.1.2.

Projected emissions are calculated based on annual firing rate expected following startup of the Project and emission factors representative of expected operation. Emission factors representative of expected operation are those factors used to represent current emissions, with alterations to the fuel gas characteristics as appropriate. Fuel gas characteristics are estimated consistent with the description in Section 2.3; heating value and carbon content are calculated using the projected fuel gas composition, and H<sub>2</sub>S content is estimated as the sum of the average and one standard deviation of monthly averages during the baseline period.

Emissions that the Cogeneration Unit HRSGs were capable of accommodating during the baseline period are calculated using the maximum monthly firing rate during the baseline period, annualized using a 98% utilization rate, and emission factors generally consistent with those used for the projected emissions. The exception is that the CO<sub>2</sub>e emission factor is based on the calculated

maximum monthly CO<sub>2</sub>e emission factor during the baseline period. This emission factor is lower than what is used for the projected emissions due to the changes in fuel gas composition.

### **B.2.9 LPG Rack**

The emissions increases at the loading rack are calculated based on the projected propane loading, isobutane unloading, butane loading and unloading, and propylene loading rates following the Project. Emission factors for the LPG products are based on calculated release rates from hose de-coupling following each loading or offloading event.

### **B.2.10 Gasoline and Diesel Loadout**

The emissions increases at the loading rack are calculated based on the projected gasoline and diesel following the Project and emission factors used in the annual emission inventory. For gasoline loadout, emissions occur both from leakage losses upstream of the vapor collection and processing system calculated based on EPA's AP-42 emission factors, and a release factor from the vapor collection and processing system. For diesel loadout, emissions are calculated based on EPA's AP-42 emission factors.

### **B.2.11 Storage Tanks**

The emissions from storage tanks are calculated using EPA's TANKS 4.09d software.

Tesoro proposes a VOC emission limit of 12.0 tons on a 12-month rolling sum basis at Tank 291. This proposed emission limit is equal to the baseline actual emissions, therefore the project emissions increase is zero from Tank 291.

The emissions increases at the other affected tanks (Tanks 204, 212, 213, 242, 243, 252, 321, 324, 325, 326, 327, 330, 331, 503, and 504) are calculated using EPA's TANKS 4.09d software. The projected throughput was distributed by product type through these tanks.

During 2010, piping to Tank 327 was modified to allow the tank to store gasoline. Tank 327 stored gasoline for the final 5 months of 2010. Since Tank 327 was capable of accommodating gasoline storage during the baseline period, the emissions that the unit was capable of accommodating are based on year-round storage of gasoline at the actual throughput observed during 2010.

### **B.2.12 New and Replaced Fugitive Components in VOC Service**

New and replaced fugitive components in VOC service will be installed in a number of existing process units, including the FCCU, CO Boiler, VRU, DDU, Crude, SRU, benzene waste handling,



storage tanks, LPG loading rack, Alkylation, and dewaxing system. New fugitive components will become part of the existing emission unit for the respective families of process equipment. The emissions increase is calculated based on the counts of new components within the existing emission units.

The majority of process fugitive components in VOC service at the Salt Lake City Refinery are already subject to NSPS Subpart VV via 40 CFR 63 Subpart CC (MACT Subpart CC), which incorporates Leak Detection and Repair (LDAR) provisions. In addition, Tesoro is subject to a Consent Agreement incorporated into the Title V permit that restricts the leak rate on light liquid and gas/vapor valves to 500 ppm and pumps to 2,000 ppm. This project is not expected to trigger NSPS Subpart VVa at existing facilities.

The USEPA Protocol for Equipment Leak Emission Estimates is used to quantify potential emissions from the new components installed as part of this project. The final number of installed components will likely change from this estimate after additional detailed design/engineering is performed; however, the change in VOC emissions from this activity is not appreciable and will not change the PSD applicability determination.

The Project will not increase the probability of a relief event of an atmospheric relief valve. Therefore, no emissions from atmospheric relief valves are included in the project emission calculations.

# Attachment B-1

## Baseline Actual Emission Calculations for Crude Unit Furnace H-101

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Crude	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	2.55	0.26	0.00	0.32	0.32	0.32	0.23	3.83E-03	3,872	0.29	0.06	3,896	46.60	86,407	127.84
Feb-08	2.56	0.22	0.00	0.32	0.32	0.32	0.23	3.29E-03	4,234	0.29	0.06	4,258	44.39	86,786	116.49
Mar-08	2.69	0.32	0.00	0.34	0.34	0.34	0.25	4.75E-03	4,064	0.30	0.06	4,089	51.84	91,284	143.00
Apr-08	2.74	0.43	0.00	0.35	0.35	0.35	0.25	6.47E-03	4,064	0.31	0.06	4,089	51.99	93,045	141.32
May-08	2.76	0.42	0.00	0.35	0.35	0.35	0.25	6.36E-03	4,145	0.31	0.06	4,170	50.55	93,443	140.05
Jun-08	3.82	0.76	0.00	0.38	0.38	0.38	0.28	1.14E-02	5,285	0.34	0.07	5,313	49.57	103,256	128.89
Jul-08	3.68	0.82	0.00	0.37	0.37	0.37	0.27	1.23E-02	4,841	0.33	0.07	4,868	54.75	99,473	134.75
Aug-08	3.30	0.47	0.00	0.33	0.33	0.33	0.24	7.06E-03	4,049	0.29	0.06	4,073	52.67	89,170	133.00
Sep-08	3.12	0.36	0.00	0.31	0.31	0.31	0.23	5.45E-03	3,818	0.28	0.06	3,841	52.15	84,317	125.90
Oct-08	3.36	0.30	0.00	0.34	0.34	0.34	0.25	4.52E-03	4,394	0.30	0.06	4,419	50.21	90,889	125.52
Nov-08	3.35	0.22	0.00	0.34	0.34	0.34	0.24	3.37E-03	4,515	0.30	0.06	4,540	43.50	90,521	118.01
Dec-08	3.21	0.20	0.00	0.32	0.32	0.32	0.23	2.93E-03	4,450	0.29	0.06	4,474	40.53	86,841	107.20
Jan-09	3.61	0.29	0.00	0.36	0.36	0.36	0.26	4.36E-03	5,212	0.32	0.06	5,239	44.61	97,630	114.38
Feb-09	3.19	0.17	0.00	0.32	0.32	0.32	0.23	2.57E-03	4,404	0.28	0.06	4,427	37.50	86,203	109.91
Mar-09	2.92	0.30	0.00	0.29	0.29	0.29	0.21	4.46E-03	4,156	0.26	0.05	4,178	46.76	79,033	118.43
Apr-09	3.21	0.36	0.00	0.32	0.32	0.32	0.23	5.44E-03	4,264	0.29	0.06	4,288	47.62	86,648	116.21
May-09	3.35	0.37	0.00	0.34	0.34	0.34	0.24	5.54E-03	4,472	0.30	0.06	4,497	52.06	90,474	120.20
Jun-09	2.98	0.38	0.00	0.30	0.30	0.30	0.22	5.71E-03	3,825	0.27	0.05	3,847	48.66	80,546	109.51
Jul-09	2.95	0.50	0.00	0.30	0.30	0.30	0.21	7.48E-03	4,046	0.28	0.06	4,069	48.35	79,654	113.44
Aug-09	3.19	0.48	0.00	0.32	0.32	0.32	0.23	7.21E-03	4,269	0.28	0.06	4,293	50.36	86,271	112.01
Sep-09	3.14	0.42	0.00	0.32	0.32	0.32	0.23	6.32E-03	4,225	0.28	0.06	4,249	48.84	84,965	109.82
Oct-09	2.85	0.36	0.00	0.29	0.29	0.29	0.21	5.35E-03	3,903	0.25	0.05	3,924	43.34	77,070	100.02
Nov-09	2.79	0.32	0.00	0.28	0.28	0.28	0.20	4.87E-03	3,696	0.25	0.05	3,716	43.45	75,317	100.41
Dec-09	3.25	0.24	0.00	0.33	0.33	0.33	0.24	3.63E-03	4,879	0.29	0.06	4,903	40.96	87,788	100.34
Jan-10	3.65	0.34	0.00	0.37	0.37	0.37	0.27	5.12E-03	4,709	0.30	0.06	4,734	49.79	98,596	115.51
Feb-10	2.99	0.46	0.00	0.30	0.30	0.30	0.22	6.91E-03	3,888	0.27	0.05	3,910	46.74	80,707	108.57
Mar-10	0.79	0.04	0.00	0.15	0.15	0.15	0.11	6.67E-04	2,300	0.13	0.03	2,311	11.25	39,422	40.88
Apr-10	1.70	0.21	0.00	0.32	0.32	0.32	0.23	3.08E-03	4,821	0.28	0.06	4,844	44.11	84,777	84.89
May-10	1.52	0.34	0.00	0.28	0.28	0.28	0.20	5.04E-03	3,712	0.25	0.05	3,733	50.95	75,924	99.33
Jun-10	1.44	0.34	0.00	0.27	0.27	0.27	0.19	5.17E-03	3,519	0.24	0.05	3,538	49.49	71,790	93.32
Jul-10	1.61	0.50	0.00	0.30	0.30	0.30	0.22	7.50E-03	3,815	0.27	0.05	3,837	52.46	80,416	109.40
Aug-10	1.65	0.47	0.00	0.31	0.31	0.31	0.22	7.09E-03	4,012	0.27	0.05	4,034	53.60	82,365	108.58
Sep-10	1.59	0.31	0.00	0.30	0.30	0.30	0.21	4.66E-03	3,884	0.26	0.05	3,906	54.00	79,638	104.62
Oct-10	1.76	0.32	0.00	0.33	0.33	0.33	0.24	4.74E-03	4,586	0.29	0.06	4,610	54.64	87,965	105.43
Nov-10	1.53	0.19	0.28	0.30	0.30	0.30	0.22	2.90E-03	4,529	0.27	0.05	4,551	48.77	80,763	88.29
Dec-10	1.47	0.26	0.27	0.29	0.29	0.29	0.21	3.87E-03	3,772	0.26	0.05	3,793	48.80	77,596	102.14
Jan-11	1.53	0.34	0.28	0.30	0.30	0.30	0.22	5.11E-03	4,214	0.27	0.05	4,236	47.58	80,362	95.57
Feb-11	1.27	0.27	0.23	0.25	0.25	0.25	0.18	4.08E-03	3,307	0.22	0.04	3,325	48.94	66,684	86.81
Mar-11	1.75	0.39	0.32	0.34	0.34	0.34	0.25	5.78E-03	4,701	0.30	0.06	4,727	54.08	91,996	115.46
Apr-11	1.72	0.38	0.32	0.34	0.34	0.34	0.24	5.67E-03	4,605	0.30	0.06	4,630	54.88	90,753	114.12
May-11	1.65	0.35	0.30	0.32	0.32	0.32	0.23	5.22E-03	4,249	0.29	0.06	4,273	54.73	86,687	114.01
Jun-11	1.57	0.30	0.29	0.31	0.31	0.31	0.22	4.49E-03	4,220	0.27	0.05	4,242	52.34	82,635	101.61

## Attachment B-1

### Baseline Actual Emission Calculations for Crude Unit Furnace H-101

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Crude	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	30.43	4.11	0.53	3.79	3.79	3.79	2.63	0.06	48,733	3.18	0.64	48,997	--	--	--
Monthly Maximum Throughput During Baseline:	98,596	115.51	98,596	103,256	103,256	103,256	98,596	115.51	115.51	115.51	115.51	115.51	54.88	103,256	143.00
Occurs:	Jan-10	Jan-10	Jan-10	Jun-08	Jun-08	Jun-08	Jan-10	Jan-10	Jan-10	Jan-10	Jan-10	Jan-10	Apr-11	Jun-08	Mar-08

#### Emission Factor References

- [1] Jan-08 through May-08: 5/4/05 stack test results of 0.059 lb/MMBtu.  
 Jun-08 through Feb-10: 5/30/08 stack test results of 0.074 lb/MMBtu.  
 Mar-10 through Oct-10: 5/7/10 stack test results of 0.040 lb/MMBtu after Low NO<sub>x</sub> burner installation in Mar-10.  
 Nov-10 through Jun-11: 10/20/10 stack test results of 0.038 lb/MMBtu.
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Jan-08 through Oct-10: 5/7/10 stack test results of 0 lb/MMBtu  
 Nov-10 through Jun-11: 10/20/10 stack test results of 0.007 lb/MMBtu
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
 CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-2

### Projected Actual Emission Calculations for Crude Unit Furnace H-101

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Projected Firing Rate:	123.64	Mscf/hr	Calculated
	134.00	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.039	lb/MMBtu	5.23	22.89	2010 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	1.03	4.50	Calculated
CO	0.0033	lb/MMBtu	0.44	1.94	2010 Stack Test Results
PM	7.45E-03	lb/MMBtu	1.00	4.37	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	1.00	4.37	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	1.00	4.37	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.72	3.16	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	1.54E-02	6.75E-02	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	17,556.74	76,898.54	2008-2011 monitoring
CH <sub>4</sub> [4]	7.17	lb/MMscf	0.89	3.88	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	0.18	0.78	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	17,630.30	77,220.73	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-2

### Projected Actual Emission Calculations for Crude Unit Furnace H-101

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	30.43	4.11	0.53	3.79	3.79	3.79	2.63	0.06	48,997	Attachment B-1
B. Capable of Accommodating	22.18	5.54	1.88	4.59	4.59	4.59	3.07	0.08	76,060	See below.
C. Projected Emissions	22.89	4.50	1.94	4.37	4.37	4.37	3.16	0.07	77,221	
D. Demand Growth (D=B-A)	0.00	1.43	1.34	0.80	0.80	0.80	0.44	0.02	27,063	
E. Projected Actual Emissions (E=C-D)	22.89	3.07	0.59	3.58	3.58	3.58	2.73	0.05	50,158	
F. Emission Increase (F=E-A)	0.00	0.00	0.06	0.00	0.00	0.00	0.10	0.00	1,161	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	98,596	115.51	98,596	103,256	103,256	103,256	98,596	115.51	115.51	
Month that this occurred:	Jan-10	Jan-10	Jan-10	Jun-08	Jun-08	Jun-08	Jan-10	Jan-10	Jan-10	
Throughput that Unit was Capable of Accommodating (Units/year)	1,137,666	1,332.89	1,137,666	1,231,159	1,231,159	1,231,159	1,137,666	1,332.89	1,332.89	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.039	8.31	0.0033	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	22.18	5.54	1.88	4.59	4.59	4.59	3.07	0.08	76,060	

# Attachment B-3

## Baseline Actual Emission Calculations for FCCU/CO Boiler

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Coke Burn Rate	Exhaust Flow	Fuel Gas Firing
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	tons coke	MMscf	MSCF
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	9.44	49.73	6.48	7.31	5.96	4.28	0.10	2.87	20,355	2.19	0.32	20,500	5,864	3,878	35,207
Feb-08	10.80	43.53	5.84	6.59	5.38	3.86	0.09	2.51	17,974	1.93	0.28	18,102	5,178	3,496	31,288
Mar-08	13.07	51.75	6.51	7.35	5.99	4.30	0.09	2.99	20,889	2.24	0.33	21,038	6,018	3,898	33,163
Apr-08	10.70	43.38	6.05	6.83	5.57	4.00	0.10	2.50	18,789	2.02	0.29	18,922	5,413	3,622	36,686
May-08	8.09	52.71	6.25	7.06	5.75	4.13	0.06	3.04	20,439	2.20	0.32	20,584	5,888	3,742	22,072
Jun-08	7.58	54.21	6.16	6.95	5.67	4.07	0.05	3.13	20,666	2.22	0.32	20,812	5,954	3,686	19,628
Jul-08	9.87	39.71	6.51	7.29	5.95	4.27	0.08	2.29	21,404	2.30	0.33	21,556	6,166	3,899	29,386
Aug-08	12.57	49.11	6.56	5.44	4.56	3.47	0.10	2.83	21,181	2.28	0.33	21,332	6,102	3,926	34,705
Sep-08	11.93	53.56	6.23	5.17	4.34	3.30	0.08	3.09	20,992	2.25	0.33	21,141	6,047	3,730	29,742
Oct-08	12.80	53.76	6.39	5.30	4.45	3.38	0.08	3.10	20,439	2.20	0.32	20,584	5,888	3,826	30,295
Nov-08	11.48	50.40	5.87	4.87	4.09	3.11	0.11	2.91	18,411	1.98	0.29	18,542	5,304	3,517	38,613
Dec-08	11.04	46.87	5.88	4.88	4.09	3.11	0.12	2.70	17,753	1.91	0.28	17,879	5,115	3,522	42,487
Jan-09	12.71	47.96	6.01	4.98	4.18	3.18	0.10	2.77	18,240	1.96	0.28	18,369	5,255	3,596	37,449
Feb-09	14.54	39.47	5.71	4.74	3.97	3.02	0.11	2.28	16,360	1.76	0.26	16,476	4,713	3,417	40,492
Mar-09	13.93	50.04	6.73	5.59	4.69	3.56	0.12	2.89	19,364	2.08	0.30	19,502	5,579	4,032	45,127
Apr-09	14.10	50.37	6.48	5.38	4.51	3.43	0.13	2.91	19,994	2.15	0.31	20,136	5,760	3,881	45,745
May-09	17.49	53.38	6.51	5.41	4.54	3.45	0.13	3.08	20,751	2.23	0.32	20,898	5,978	3,901	47,480
Jun-09	11.19	56.81	6.22	5.16	4.33	3.29	0.10	3.28	20,682	2.22	0.32	20,829	5,958	3,725	34,973
Jul-09	16.30	49.61	6.30	5.23	4.38	3.33	0.10	2.86	20,390	2.19	0.32	20,535	5,874	3,771	37,213
Aug-09	15.41	50.14	6.35	5.27	4.42	3.36	0.10	2.89	20,655	2.22	0.32	20,801	5,950	3,803	34,625
Sep-09	12.15	51.64	5.83	4.84	4.06	3.08	0.10	2.98	20,253	2.18	0.32	20,397	5,835	3,492	35,423
Oct-09	10.07	44.89	6.07	4.64	3.93	3.04	0.11	2.59	20,250	2.18	0.32	20,394	5,834	3,636	40,595
Nov-09	10.72	45.44	5.89	4.45	3.77	2.92	0.10	2.62	19,659	2.11	0.31	19,798	5,664	3,528	37,206
Dec-09	8.37	43.84	5.92	4.47	3.79	2.94	0.11	2.53	18,092	1.94	0.28	18,221	5,212	3,547	39,316
Jan-10	9.71	42.36	5.83	4.40	3.73	2.89	0.13	2.44	17,966	1.93	0.28	18,093	5,176	3,490	47,374
Feb-10	9.69	34.61	5.43	4.10	3.47	2.69	0.17	2.00	16,511	1.77	0.26	16,628	4,757	3,252	62,980
Mar-10	5.71	23.71	4.19	3.16	2.68	2.08	0.11	1.37	14,693	1.58	0.23	14,798	4,233	2,509	40,775
Apr-10	10.55	37.99	5.70	4.30	3.65	2.83	0.12	2.19	16,993	1.83	0.27	17,114	4,896	3,415	42,443
May-10	11.86	58.08	9.07	4.47	3.79	2.94	0.13	3.35	21,447	2.30	0.34	21,599	6,179	3,549	49,076
Jun-10	11.94	58.90	9.01	4.47	3.79	2.94	0.13	3.40	21,264	2.28	0.33	21,415	6,126	3,550	46,952
Jul-10	15.27	61.46	5.89	4.53	3.84	2.98	0.10	3.55	22,176	2.38	0.35	22,334	6,389	3,594	38,029
Aug-10	14.70	63.30	7.98	4.66	3.95	3.06	0.12	3.65	22,374	2.40	0.35	22,533	6,446	3,700	42,406
Sep-10	13.33	56.17	5.08	4.18	3.54	2.74	0.10	3.24	20,938	2.25	0.33	21,087	6,032	3,268	35,972
Oct-10	13.21	61.55	6.02	6.59	5.38	3.87	0.10	3.55	22,123	2.38	0.35	22,280	6,373	3,547	37,809
Nov-10	14.13	55.84	4.77	6.68	5.45	3.92	0.12	3.22	20,869	2.24	0.33	21,018	6,012	3,597	45,257
Dec-10	9.84	38.58	4.38	6.32	5.16	3.71	0.13	2.23	18,361	1.97	0.29	18,491	5,290	3,405	45,770
Jan-11	10.32	39.68	6.22	6.45	5.26	3.78	0.14	2.29	18,401	1.98	0.29	18,532	5,301	3,471	51,088
Feb-11	11.53	32.51	7.36	5.78	4.72	3.39	0.11	1.88	17,890	1.92	0.28	18,017	5,154	3,110	39,833
Mar-11	13.80	48.62	7.35	6.78	5.54	3.98	0.11	2.81	21,808	2.34	0.34	21,962	6,283	3,653	40,144
Apr-11	14.21	47.32	4.21	6.29	5.13	3.69	0.10	2.73	21,687	2.33	0.34	21,841	6,248	3,386	35,552
May-11	16.31	55.03	3.21	5.16	4.34	3.31	0.10	3.18	22,893	2.46	0.36	23,055	6,595	3,789	35,787
Jun-11	13.93	48.23	1.49	4.69	3.94	3.00	0.11	2.78	21,054	2.26	0.33	21,203	6,065	3,440	39,519

## Attachment B-3

### Baseline Actual Emission Calculations for FCCU/CO Boiler

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Coke Burn Rate	Exhaust Flow	Fuel Gas Firing
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	tons coke	MMscf	MSCF
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period															
Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	149.07	579.05	74.62	60.24	50.52	38.36	1.39	33.42	239,188	25.69	3.74	240,886	--	--	--
Monthly Maximum Throughput During															
Baseline:	N/A	6,595	4,032	4,032	4,032	4,032	62,980	6,595	6,595	6,595	6,595	6,595	6,595	4,032	62,980
Occurs:	N/A	May-11	Mar-09	Mar-09	Mar-09	Mar-09	Feb-10	May-11	May-11	May-11	May-11	May-11	May-11	Mar-09	Feb-10

#### References

- [1] Based on CEMS data.
- [2] Based on CEMS data.
- [3] Based on CEMS data. Direct measurements began 5/6/10; calculated emission factor applied retroactively.
- [4] Filterable emission factor derived from particle size distributions from 2011 engineering testing data (1.332 lb PM/lb PM10).  
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
- [5] Filterable emission factors from 5/14/07, 5/28/08, 8/5/09, 8/5/10 stack testing data, and 2011 engineering testing data.  
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
- [6] Filterable emission factor derived from particle size distributions from 2011 engineering testing data (0.585 lb PM2.5/lb PM10).  
Condensable emission factor derived from 4/6/11, 4/11/11, 5/5/11, and 5/10/11 engineering test data (0.98 lb/MMscf).
- [7] Emission factor of 5.5 lb/MMscf per AP-42 Table 1.4-2 multiplied by the fuel gas firing rate.
- [8] Refer to Attachment B-4 for derivation of this emission factor.
- [9] Emission factor of 3,471.13 lb/1,000-lb per 40 CFR 98 Subpart Y (refer to projected emission calculations).  
CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-4

### Projected Actual Emission Calculations for FCCU/CO Boiler

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Coke Burn:	19,994	lb/hr	Engineering estimate
	19.994	1,000-lb/hr	
Carbon Content:	0.94	lb C / lb coke	40 CFR 98, Equation Y-8
Exhaust Flow Rate:	93249	scfm	Engineering estimate
CO Boiler Firing:	30.0	MMBtu/hr	Engineering estimate

Hours of Operation: 8760 hr/yr

<b>Pollutant</b>	<b>Emission Factor</b>	<b>Units</b>	<b>Projected Emissions (lb/hr) [1]</b>	<b>Projected Emissions (tpy) [2]</b>	<b>Emission Factor Reference</b>
NO <sub>x</sub>	--	--	39.73	174.00	Emission limit
SO <sub>2</sub>	8.70	lb/1,000-lb	173.9	761.89	2008-2011 CEMS Data
CO	5.58	lb/MMscf exhaust	31.22	136.74	2008-2011 CEMS Data
PM	4.59	lb/MMscf exhaust	25.67	112.42	7/7/11 Stack Testing
PM <sub>10</sub>	3.94	lb/MMscf exhaust	22.04	96.55	7/7/11 Stack Testing
PM <sub>2.5</sub>	3.13	lb/MMscf exhaust	17.52	76.72	7/7/11 Stack Testing
VOC	0.005	lb/MMBtu	0.16	0.71	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub> [3]	0.50	lb/1,000-lb	10.04	43.97	See following pages.
CO <sub>2</sub> [4]	3446.67	lb/1,000-lb	68,913	301,837	40 CFR 98 Subpart Y
CH <sub>4</sub> [5]	0.37	lb/1,000-lb	7.40	32.42	40 CFR 98 Subpart Y
N <sub>2</sub> O [6]	0.05	lb/1,000-lb	1.08	4.72	40 CFR 98 Subpart Y
CO <sub>2</sub> e [7]	3471.13	lb/1,000-lb	69,402	303,980	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/1,000-lb) x Coke Burn (lb/yr) / Hours of Operation (hr/yr)

[2] Projected Emissions (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] See following pages of Attachment B-4 for derivation of this emission factor.

[4] Emission factor based on carbon content and 44 lb CO<sub>2</sub>/12 lb C per Equation Y-8 of 40 CFR 98

[5] Emission factor = CO<sub>2</sub> factor \* 0.011 / 102.41 lb/1,000-lb per Equation Y-9 of 40 CFR 98

[6] Emission factor = CO<sub>2</sub> factor \* 0.0016 / 102.41 lb/1,000-lb per Equation Y-10 of 40 CFR 98

[7] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98



## Attachment B-4

### Projected Actual Emission Calculations for FCCU/CO Boiler

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	149.07	579.05	74.62	60.24	50.52	38.36	1.39	33.42	240,886	Attachment B-3
B. Capable of Accommodating	N/A	645.38	129.81	106.72	91.66	72.83	2.21	37.24	264,154	See below.
C. Projected Emissions	174.00	761.89	136.74	112.42	96.55	76.72	0.71	43.97	303,980	
D. Demand Growth (D=B-A)	0.00	66.34	55.18	46.48	41.14	34.47	0.82	3.83	23,268	
E. Projected Actual Emissions (E=C-D)	174.00	695.55	81.56	65.94	55.41	42.25	0.00	40.14	280,712	
F. Emission Increase (F=E-A)	24.93	116.51	6.93	5.70	4.90	3.89	0.00	6.72	39,826	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits	174.00	671.43	N/A	N/A	N/A	N/A	N/A	41.13	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A	6,595	4,032	4,032	4,032	4,032	62,980	6,595	6,595	
Month that this occurred:	N/A	May-11	Mar-09	Mar-09	Mar-09	Mar-09	Feb-10	May-11	May-11	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A	76,100	46,527	46,527	46,527	46,527	804,563	76,100	76,100	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A	17.0	5.58	4.59	3.94	3.13	0.006	0.98	6,942	lb/ton = 2 * lb/1,000-lb
Units	N/A	tons coke	MMscf	MMscf	MMscf	MMscf	MSCF	tons coke	tons coke	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	N/A	645.38	129.81	106.72	91.66	72.83	2.21	37.24	264,154	

Annualized rate assumes a 98% capacity factor to account for unit downtime.

SO2 emission rate calculated from 705 tpy SOx emission limit divided by 1.05 consistent with Permit Condition II.B.3.d.1.

PM10 annual emission limit of 69 tpy includes only filterable PM10. Project emission increases include filterable and condensable PM10.

NOx potential emissions based on the annual emission limit at the unit rather than projected actual emissions.

## Attachment B-4

### Projected Actual Emission Calculations for FCCU/CO Boiler

#### Derivation of H<sub>2</sub>SO<sub>4</sub> Emission Factor

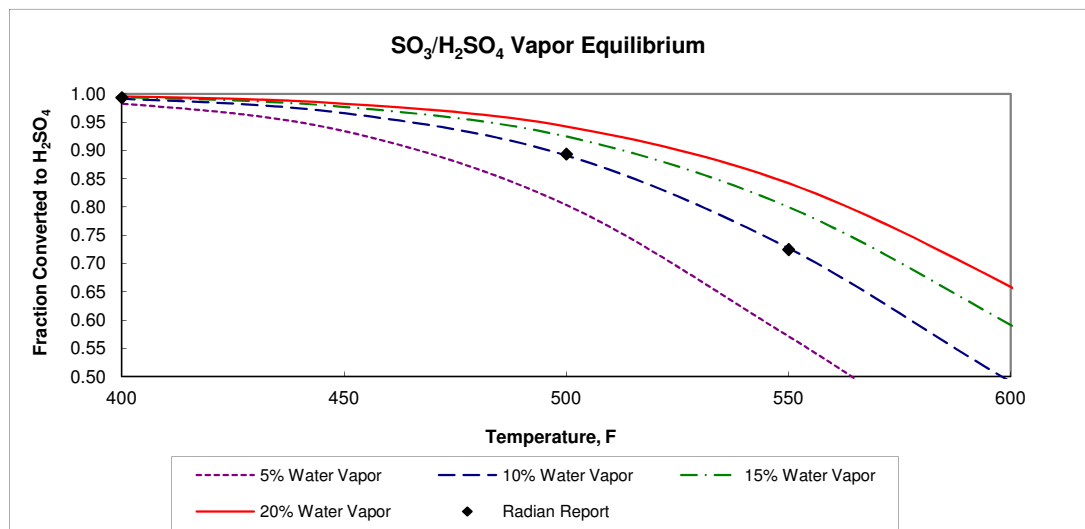
Permit Condition II.B.3.d.1 states the following:

Each day, the daily SO<sub>x</sub> emissions from the FCCU regenerator, as calculated elsewhere in this permit, shall be multiplied by a factor of 1.05 and divided by the amount of coke burned in the FCCU regenerator during the same period. The result shall be added to the calculated values for the previous six days and the total divided by seven to determine the seven-day average.

Total SO<sub>x</sub> = 1.05 \* SO<sub>2</sub> --> SO<sub>3</sub> is equal to 5% of measured SO<sub>2</sub> emissions.

Fraction of SO<sub>3</sub> converted to H<sub>2</sub>SO<sub>4</sub> based on September 1964 article from the American Institute of Chemical Engineering (AIChE) Journal. Refer to figure below. At typical stack conditions (465 F, 8.6% moisture), 94.2% of SO<sub>3</sub> is converted to H<sub>2</sub>SO<sub>4</sub>. Resulting value is corrected to H<sub>2</sub>SO<sub>4</sub> by molecular weight (98.03 / 80.01).

H<sub>2</sub>SO<sub>4</sub> (lb/1,000 lb) = SO<sub>2</sub> (lb/1,000 lb) x 0.05 x 0.942 x 98.03 / 80.01 = 0.0577 \* SO<sub>2</sub> (lb/1,000 lb) = 0.49 lb/1,000 lb



## Attachment B-4

### Projected Actual Emission Calculations for FCCU/CO Boiler

#### Summary of 2011 Engineering Test Results

	4/6 Case 1	4/11 Case 2	5/5 Case 1	5/10 Case 2	Average
PM (lb/MMscf)	3.67	2.09	3.09	2.63	2.87
PM10 (lb/MMscf)	2.02	1.88	2.92	2.34	2.29
PM2.5 (lb/MMscf)	1.28	1.51	2.42	1.69	1.72
Condensables	0.74	0.94	1.50	0.76	0.98

Emissions of PM, PM10, and PM2.5 include condensables as presented above.

#### Particle Size Distribution (Filterable)

	4/6 Case 1	4/11 Case 2	5/5 Case 1	5/10 Case 2	Average
PM	1.00	1.00	1.00	1.00	1.00
PM10	0.44	0.82	0.90	0.85	0.75
PM2.5	0.19	0.49	0.58	0.50	0.44

# Attachment B-5

## Baseline Actual Emission Calculations for Ultraformer Unit Furnace F-1

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	4.42	0.20	2.76	0.25	0.25	0.25	0.18	2.97E-03	3,005	0.22	0.04	3,023	9.99	67,048	99.19
Feb-08	3.92	0.17	2.70	0.24	0.24	0.24	0.18	2.48E-03	3,199	0.22	0.04	3,217	9.31	65,564	88.01
Mar-08	4.69	0.23	2.77	0.25	0.25	0.25	0.18	3.50E-03	2,992	0.22	0.04	3,011	10.32	67,207	105.29
Apr-08	4.71	0.32	2.87	0.26	0.26	0.26	0.19	4.84E-03	3,040	0.23	0.05	3,059	10.23	69,596	105.70
May-08	4.77	0.32	2.95	0.27	0.27	0.27	0.19	4.87E-03	3,174	0.24	0.05	3,194	10.29	71,560	107.25
Jun-08	4.25	0.56	3.15	0.28	0.28	0.28	0.21	8.42E-03	3,913	0.25	0.05	3,934	9.65	76,467	95.45
Jul-08	4.45	0.61	3.04	0.27	0.27	0.27	0.20	9.14E-03	3,591	0.24	0.05	3,611	9.92	73,790	99.96
Aug-08	4.39	0.35	2.73	0.25	0.25	0.25	0.18	5.24E-03	3,004	0.22	0.04	3,022	9.55	66,154	98.67
Sep-08	4.13	0.27	2.56	0.23	0.23	0.23	0.17	4.02E-03	2,813	0.21	0.04	2,830	9.17	62,123	92.76
Oct-08	3.81	0.21	2.55	0.23	0.23	0.23	0.17	3.08E-03	2,995	0.20	0.04	3,012	8.24	61,939	85.54
Nov-08	4.27	0.16	2.65	0.24	0.24	0.24	0.17	2.39E-03	3,204	0.21	0.04	3,221	7.81	64,230	83.73
Dec-08	4.25	0.14	2.63	0.24	0.24	0.24	0.17	2.16E-03	3,275	0.21	0.04	3,292	7.59	63,912	78.90
Jan-09	4.87	0.22	3.02	0.27	0.27	0.27	0.20	3.28E-03	3,912	0.24	0.05	3,932	7.90	73,267	85.84
Feb-09	4.38	0.13	2.71	0.25	0.25	0.25	0.18	1.96E-03	3,364	0.22	0.04	3,382	8.42	65,848	83.95
Mar-09	4.50	0.25	2.79	0.25	0.25	0.25	0.18	3.82E-03	3,563	0.22	0.04	3,581	10.06	67,742	101.51
Apr-09	4.47	0.28	2.77	0.25	0.25	0.25	0.18	4.22E-03	3,310	0.22	0.04	3,328	9.59	67,260	90.20
May-09	5.29	0.33	3.28	0.30	0.30	0.30	0.21	4.88E-03	3,932	0.26	0.05	3,954	10.16	79,555	105.69
Jun-09	4.96	0.35	3.07	0.28	0.28	0.28	0.20	5.28E-03	3,542	0.25	0.05	3,562	10.31	74,579	101.40
Jul-09	5.02	0.45	3.11	0.28	0.28	0.28	0.20	6.73E-03	3,642	0.25	0.05	3,662	10.44	75,487	102.10
Aug-09	4.57	0.38	2.83	0.26	0.26	0.26	0.19	5.75E-03	3,403	0.23	0.05	3,422	9.52	68,763	89.28
Sep-09	4.63	0.35	2.87	0.26	0.26	0.26	0.19	5.18E-03	3,466	0.23	0.05	3,485	9.95	69,687	90.07
Oct-09	4.48	0.31	2.78	0.25	0.25	0.25	0.18	4.68E-03	3,414	0.22	0.04	3,432	9.09	67,400	87.47
Nov-09	3.61	0.27	2.61	0.24	0.24	0.24	0.17	4.10E-03	3,107	0.21	0.04	3,125	9.48	63,324	84.42
Dec-09	3.22	0.15	2.33	0.21	0.21	0.21	0.15	2.32E-03	3,118	0.19	0.04	3,133	5.65	56,538	64.12
Jan-10	4.49	0.27	3.24	0.29	0.29	0.29	0.21	4.09E-03	3,761	0.24	0.05	3,781	9.70	78,759	92.27
Feb-10	3.63	0.36	2.62	0.24	0.24	0.24	0.17	5.44E-03	3,064	0.21	0.04	3,081	9.98	63,601	85.56
Mar-10	1.09	0.02	0.79	0.07	0.07	0.07	0.05	3.25E-04	1,120	0.06	0.01	1,125	1.25	19,186	19.90
Apr-10	4.03	0.17	2.91	0.26	0.26	0.26	0.19	2.57E-03	4,019	0.23	0.05	4,038	7.05	70,673	70.77
May-10	4.56	0.35	3.29	0.30	0.30	0.30	0.22	5.31E-03	3,910	0.26	0.05	3,932	10.74	79,965	104.62
Jun-10	4.22	0.36	3.05	0.28	0.28	0.28	0.20	5.34E-03	3,631	0.24	0.05	3,652	10.39	74,092	96.31
Jul-10	4.51	0.49	3.26	0.29	0.29	0.29	0.21	7.38E-03	3,754	0.26	0.05	3,775	10.75	79,122	107.65
Aug-10	4.60	0.46	3.32	0.30	0.30	0.30	0.22	6.94E-03	3,927	0.27	0.05	3,949	10.87	80,633	106.30
Sep-10	4.30	0.29	3.10	0.28	0.28	0.28	0.20	4.41E-03	3,676	0.25	0.05	3,697	10.57	75,363	99.00
Oct-10	4.56	0.29	3.30	0.30	0.30	0.30	0.22	4.31E-03	4,170	0.26	0.05	4,192	10.09	79,985	95.87
Nov-10	3.20	0.16	2.71	0.25	0.25	0.25	0.18	2.36E-03	3,695	0.22	0.04	3,713	7.84	65,892	72.03
Dec-10	3.53	0.24	3.00	0.27	0.27	0.27	0.20	3.63E-03	3,537	0.24	0.05	3,557	10.24	72,776	95.80
Jan-11	3.42	0.30	2.90	0.26	0.26	0.26	0.19	4.48E-03	3,694	0.23	0.05	3,713	9.00	70,446	83.78
Feb-11	2.96	0.25	2.51	0.23	0.23	0.23	0.16	3.73E-03	3,023	0.20	0.04	3,040	9.46	60,963	79.36
Mar-11	3.65	0.32	3.10	0.28	0.28	0.28	0.20	4.74E-03	3,850	0.25	0.05	3,871	10.11	75,339	94.55
Apr-11	3.61	0.31	3.07	0.28	0.28	0.28	0.20	4.65E-03	3,782	0.25	0.05	3,802	9.98	74,535	93.72
May-11	3.49	0.29	2.97	0.27	0.27	0.27	0.19	4.34E-03	3,529	0.24	0.05	3,549	9.85	71,991	94.68
Jun-11	3.42	0.26	2.91	0.26	0.26	0.26	0.19	3.84E-03	3,606	0.23	0.05	3,625	9.25	70,612	86.83

## Attachment B-5

### Baseline Actual Emission Calculations for Ultraformer Unit Furnace F-1

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	50.72	3.60	34.23	3.00	3.00	3.00	2.25	0.05	41,916	2.75	0.55	42,144	--	--	--
Monthly Maximum Throughput During Baseline:	80,633	107.65	80,633	79,965	79,965	79,965	80,633	107.65	107.65	107.65	107.65	107.65	10.87	80,633	107.65
Occurs:	Aug-10	Jul-10	Aug-10	May-10	May-10	May-10	Aug-10	Jul-10	Jul-10	Jul-10	Jul-10	Jul-10	Aug-10	Aug-10	Jul-10

#### Emission Factor References

- [1] Jan-08 through Oct-08: 11/18/04 stack test results of 89.04 lb/MMscf.  
Nov-08 through Oct-09: 10/21/08 stack test results of 0.133 lb/MMBtu.  
Nov-09 through Oct-10: 10/21/09 stack test results of 0.114 lb/MMBtu.  
Nov-10 through Jun-11: 10/28/10 stack test results of 0.097 lb/MMBtu.
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-6

### Projected Actual Emission Calculations for Ultraformer Unit Furnace F-1

Quantity	Value	Units	Reference
Projected Firing Rate:	97.16	Mscf/hr	Calculated
	105.30	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.115	lb/MMBtu	12.11	53.04	2008-2010 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	0.81	3.53	Calculated
CO	0.0824	lb/MMBtu	8.67	37.98	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.78	3.44	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	0.78	3.44	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	0.78	3.44	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.57	2.49	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	1.21E-02	5.30E-02	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	13,796.46	60,428.48	2008-2011 Monitoring
CH <sub>4</sub> [4]	7.17	lb/MMscf	0.70	3.05	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	0.14	0.61	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	13,854.26	60,681.66	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or

Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-6

### Projected Actual Emission Calculations for Ultraformer Unit Furnace F-1

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	50.72	3.60	34.23	3.00	3.00	3.00	2.25	0.05	42,144	Attachment B-5
B. Capable of Accommodating	53.50	5.16	38.31	3.44	3.44	3.44	2.51	0.08	70,878	See below.
C. Projected Emissions	53.04	3.53	37.98	3.44	3.44	3.44	2.49	0.05	60,682	
D. Demand Growth (D=B-A)	2.78	1.56	4.08	0.44	0.44	0.44	0.26	0.02	28,734	
E. Projected Actual Emissions (E=C-D)	50.26	1.98	33.90	3.00	3.00	3.00	2.23	0.03	31,947	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	80,633	107.65	80,633	79,965	79,965	79,965	80,633	107.65	107.65	
Month that this occurred:	Aug-10	Jul-10	Aug-10	May-10	May-10	May-10	Aug-10	Jul-10	Jul-10	
Throughput that Unit was Capable of Accommodating (Units/year)	930,398	1,242.09	930,398	922,692	922,692	922,692	930,398	1,242.09	1,242.09	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.115	8.31	0.08	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	53.50	5.16	38.31	3.44	3.44	3.44	2.51	0.08	70,878	

# Attachment B-7

## Baseline Actual Emission Calculations for UFU Regeneration Heater

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.73E-04	175	0.01	0.00	176	9.99	3,895	5.76
Feb-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.55E-04	200	0.01	0.00	201	9.31	4,093	5.49
Mar-08	0.19	0.01	0.16	0.01	0.01	0.01	0.01	2.05E-04	176	0.01	0.00	177	10.32	3,949	6.19
Apr-08	0.19	0.02	0.16	0.01	0.01	0.01	0.01	2.65E-04	167	0.01	0.00	168	10.23	3,814	5.79
May-08	0.20	0.02	0.17	0.01	0.01	0.01	0.01	2.73E-04	178	0.01	0.00	179	10.29	4,012	6.01
Jun-08	0.17	0.03	0.14	0.01	0.01	0.01	0.01	3.88E-04	180	0.01	0.00	181	9.65	3,520	4.39
Jul-08	0.23	0.04	0.19	0.02	0.02	0.02	0.01	5.78E-04	227	0.02	0.00	229	9.92	4,669	6.32
Aug-08	0.16	0.02	0.13	0.01	0.01	0.01	0.01	2.58E-04	148	0.01	0.00	149	9.55	3,261	4.86
Sep-08	0.12	0.01	0.10	0.01	0.01	0.01	0.01	1.64E-04	115	0.01	0.00	115	9.17	2,533	3.78
Oct-08	0.15	0.01	0.13	0.01	0.01	0.01	0.01	1.51E-04	147	0.01	0.00	148	8.24	3,037	4.19
Nov-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.51E-04	203	0.01	0.00	204	7.81	4,070	5.31
Dec-08	0.20	0.01	0.17	0.02	0.02	0.02	0.01	1.41E-04	214	0.01	0.00	215	7.59	4,179	5.16
Jan-09	0.22	0.01	0.18	0.02	0.02	0.02	0.01	1.99E-04	238	0.01	0.00	239	7.90	4,456	5.22
Feb-09	0.20	0.01	0.16	0.01	0.01	0.01	0.01	1.19E-04	204	0.01	0.00	205	8.42	3,984	5.08
Mar-09	0.17	0.01	0.15	0.01	0.01	0.01	0.01	1.99E-04	185	0.01	0.00	186	10.06	3,525	5.28
Apr-09	0.17	0.01	0.14	0.01	0.01	0.01	0.01	2.14E-04	168	0.01	0.00	169	9.59	3,416	4.58
May-09	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.51E-04	203	0.01	0.00	204	10.16	4,100	5.45
Jun-09	0.17	0.02	0.15	0.01	0.01	0.01	0.01	2.53E-04	169	0.01	0.00	170	10.31	3,566	4.85
Jul-09	0.18	0.02	0.16	0.01	0.01	0.01	0.01	3.36E-04	182	0.01	0.00	183	10.44	3,772	5.10
Aug-09	0.19	0.02	0.16	0.01	0.01	0.01	0.01	3.28E-04	194	0.01	0.00	195	9.52	3,927	5.10
Sep-09	0.19	0.02	0.16	0.01	0.01	0.01	0.01	2.94E-04	197	0.01	0.00	198	9.95	3,955	5.11
Oct-09	0.18	0.02	0.16	0.01	0.01	0.01	0.01	2.62E-04	191	0.01	0.00	192	9.09	3,770	4.89
Nov-09	0.16	0.01	0.13	0.01	0.01	0.01	0.01	2.12E-04	161	0.01	0.00	162	9.48	3,273	4.36
Dec-09	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.60E-04	215	0.01	0.00	216	5.65	3,894	4.42
Jan-10	0.22	0.02	0.18	0.02	0.02	0.02	0.01	2.31E-04	212	0.01	0.00	213	9.70	4,446	5.21
Feb-10	0.19	0.02	0.16	0.01	0.01	0.01	0.01	3.24E-04	182	0.01	0.00	183	9.98	3,782	5.09
Mar-10	0.04	0.00	0.03	0.00	0.00	0.00	0.00	1.26E-05	43	0.00	0.00	44	1.25	743	0.77
Apr-10	0.19	0.01	0.16	0.01	0.01	0.01	0.01	1.37E-04	215	0.01	0.00	216	7.05	3,779	3.78
May-10	0.11	0.01	0.09	0.01	0.01	0.01	0.01	1.48E-04	109	0.01	0.00	109	10.74	2,224	2.91
Jun-10	0.11	0.01	0.09	0.01	0.01	0.01	0.01	1.56E-04	106	0.01	0.00	107	10.39	2,165	2.81
Jul-10	0.20	0.03	0.17	0.02	0.02	0.02	0.01	3.79E-04	193	0.01	0.00	194	10.75	4,058	5.52
Aug-10	0.22	0.03	0.18	0.02	0.02	0.02	0.01	3.82E-04	217	0.01	0.00	218	10.87	4,445	5.86
Sep-10	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.39E-04	199	0.01	0.00	200	10.57	4,082	5.36
Oct-10	0.20	0.01	0.17	0.02	0.02	0.02	0.01	2.21E-04	214	0.01	0.00	215	10.09	4,108	4.92
Nov-10	0.21	0.01	0.17	0.02	0.02	0.02	0.01	1.52E-04	238	0.01	0.00	239	7.84	4,238	4.63
Dec-10	0.21	0.01	0.18	0.02	0.02	0.02	0.01	2.17E-04	211	0.01	0.00	212	10.24	4,340	5.71
Jan-11	0.23	0.02	0.19	0.02	0.02	0.02	0.01	2.97E-04	245	0.02	0.00	246	9.00	4,665	5.55
Feb-11	0.21	0.02	0.17	0.02	0.02	0.02	0.01	2.59E-04	210	0.01	0.00	211	9.46	4,237	5.52
Mar-11	0.24	0.02	0.21	0.02	0.02	0.02	0.01	3.14E-04	255	0.02	0.00	257	10.11	4,995	6.27
Apr-11	0.20	0.02	0.17	0.02	0.02	0.02	0.01	2.56E-04	208	0.01	0.00	209	9.98	4,093	5.15
May-11	0.23	0.02	0.19	0.02	0.02	0.02	0.01	2.85E-04	232	0.02	0.00	233	9.85	4,735	6.23
Jun-11	0.22	0.02	0.18	0.02	0.02	0.02	0.01	2.42E-04	227	0.01	0.00	228	9.25	4,447	5.47



## Attachment B-7

### Baseline Actual Emission Calculations for UFU Regeneration Heater

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	2.15	0.20	1.82	0.16	0.16	0.16	0.12	0.00	2,298	0.15	0.03	2,311	--	--	--
Monthly Maximum Throughput During Baseline:	4,456	6.27	4,665	4,669	4,669	4,669	4,456	6.27	6.27	6.27	6.27	6.27	10.87	4,995	6.32
Occurs:	Jan-09	Mar-11	Jan-11	Jul-08	Jul-08	Jul-08	Jan-09	Mar-11	Mar-11	Mar-11	Mar-11	Mar-11	Aug-10	Mar-11	Jul-08

#### Emission Factor References

- [1] Emission factor of 0.098 lb/MMBtu per AP-42 Table 1.4-1.
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
 CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-8

### Projected Actual Emission Calculations for UFU Regeneration Heater

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Projected Firing Rate:	6.00	Mscf/hr	Calculated
	6.50	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	9.80E-02	lb/MMBtu	0.64	2.79	AP-42 Table 1.4-1
SO <sub>2</sub>	8.31	lb/MMscf	4.98E-02	0.22	Calculated
CO	8.24E-02	lb/MMBtu	0.54	2.34	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	4.84E-02	0.21	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	3.50E-02	0.15	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	7.47E-04	3.27E-03	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	851.63	3,730.15	2008-2011 Monitoring
CH <sub>4</sub> [4]	7.17	lb/MMscf	4.30E-02	0.19	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	8.60E-03	3.77E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	855.20	3,745.78	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-8

### Projected Actual Emission Calculations for UFU Regeneration Heater

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	2.15	0.20	1.82	0.16	0.16	0.16	0.12	0.00	2,311	Attachment B-7
B. Capable of Accommodating	2.52	0.30	2.22	0.20	0.20	0.20	0.14	0.00	4,127	See below.
C. Projected Emissions	2.79	0.22	2.34	0.21	0.21	0.21	0.15	0.00	3,746	
D. Demand Growth (D=B-A)	0.37	0.11	0.39	0.04	0.04	0.04	0.02	0.00	1,816	
E. Projected Actual Emissions (E=C-D)	2.42	0.11	1.95	0.17	0.17	0.17	0.13	0.00	1,929	
F. Emission Increase (F=E-A)	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0	

<b>B. Capable of Accommodating</b>	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	4,456	6.27	4,665	4,669	4,669	4,669	4,456	6.27	6.27	
Month that this occurred:	Jan-09	Mar-11	Jan-11	Jul-08	Jul-08	Jul-08	Jan-09	Mar-11	Mar-11	
Throughput that Unit was Capable of Accommodating (Units/year)	51,420	72.33	53,833	53,877	53,877	53,877	51,420	72.33	72.33	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.098	8.31	0.08	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	2.52	0.30	2.22	0.20	0.20	0.20	0.14	0.00	4,127	

# Attachment B-9

## Baseline Actual Emission Calculations for DDU Charge Heater F-680

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.05	0.01	0.08	0.01	0.01	0.01	0.01	8.67E-05	88	6.45E-03	1.29E-03	88	8.60	1,956	2.89
Feb-08	0.11	0.01	0.18	0.02	0.02	0.02	0.01	1.68E-04	217	1.47E-02	2.94E-03	218	10.62	4,448	5.97
Mar-08	0.10	0.01	0.16	0.01	0.01	0.01	0.01	2.07E-04	177	1.31E-02	2.62E-03	178	11.93	3,972	6.22
Apr-08	0.10	0.02	0.18	0.02	0.02	0.02	0.01	2.96E-04	186	1.40E-02	2.81E-03	187	9.76	4,254	6.46
May-08	0.08	0.01	0.13	0.01	0.01	0.01	0.01	2.14E-04	140	1.04E-02	2.08E-03	141	10.09	3,150	4.72
Jun-08	0.10	0.03	0.17	0.02	0.02	0.02	0.01	4.53E-04	210	1.36E-02	2.71E-03	212	12.58	4,112	5.13
Jul-08	0.11	0.04	0.18	0.02	0.02	0.02	0.01	5.42E-04	213	1.44E-02	2.89E-03	214	12.54	4,374	5.93
Aug-08	0.09	0.02	0.15	0.01	0.01	0.01	0.01	2.86E-04	164	1.19E-02	2.38E-03	165	12.80	3,609	5.38
Sep-08	0.11	0.02	0.18	0.02	0.02	0.02	0.01	2.78E-04	195	1.42E-02	2.84E-03	196	13.56	4,299	6.42
Oct-08	0.14	0.02	0.24	0.02	0.02	0.02	0.02	2.85E-04	277	1.89E-02	3.78E-03	279	14.66	5,731	7.91
Nov-08	0.14	0.01	0.18	0.02	0.02	0.02	0.01	1.64E-04	220	1.46E-02	2.91E-03	221	9.21	4,416	5.76
Dec-08	0.18	0.01	0.23	0.02	0.02	0.02	0.02	1.91E-04	290	1.86E-02	3.73E-03	291	11.65	5,651	6.98
Jan-09	0.19	0.02	0.25	0.02	0.02	0.02	0.02	2.67E-04	319	1.97E-02	3.95E-03	321	12.14	5,983	7.01
Feb-09	0.21	0.01	0.26	0.02	0.02	0.02	0.02	1.89E-04	325	2.10E-02	4.19E-03	326	11.75	6,353	8.10
Mar-09	0.21	0.02	0.26	0.02	0.02	0.02	0.02	3.60E-04	336	2.11E-02	4.22E-03	338	12.86	6,394	9.58
Apr-09	0.35	0.05	0.45	0.04	0.04	0.04	0.03	6.85E-04	537	3.60E-02	7.20E-03	540	13.31	10,907	14.63
May-09	0.37	0.05	0.47	0.04	0.04	0.04	0.03	7.06E-04	570	3.80E-02	7.61E-03	573	13.39	11,524	15.31
Jun-09	0.31	0.05	0.39	0.04	0.04	0.04	0.03	6.78E-04	455	3.16E-02	6.32E-03	457	12.17	9,576	13.02
Jul-09	0.34	0.06	0.43	0.04	0.04	0.04	0.03	9.71E-04	526	3.60E-02	7.19E-03	529	14.11	10,348	14.74
Aug-09	0.38	0.06	0.48	0.04	0.04	0.04	0.03	9.66E-04	572	3.81E-02	7.63E-03	575	13.50	11,557	15.00
Sep-09	0.34	0.05	0.43	0.04	0.04	0.04	0.03	7.85E-04	525	3.49E-02	6.97E-03	528	13.56	10,563	13.65
Oct-09	0.23	0.03	0.29	0.03	0.03	0.03	0.02	4.88E-04	356	2.32E-02	4.64E-03	358	11.58	7,030	9.12
Nov-09	0.21	0.03	0.27	0.02	0.02	0.02	0.02	4.27E-04	323	2.18E-02	4.35E-03	325	13.17	6,591	8.79
Dec-09	0.20	0.02	0.25	0.02	0.02	0.02	0.02	2.55E-04	342	2.05E-02	4.10E-03	344	10.92	6,162	7.04
Jan-10	0.27	0.03	0.34	0.03	0.03	0.03	0.02	4.34E-04	399	2.58E-02	5.16E-03	401	12.75	8,357	9.79
Feb-10	0.14	0.02	0.18	0.02	0.02	0.02	0.01	3.73E-04	210	1.44E-02	2.88E-03	211	10.69	4,365	5.87
Mar-10	0.05	0.00	0.06	0.01	0.01	0.01	0.00	2.40E-05	83	4.68E-03	9.36E-04	83	1.74	1,419	1.47
Apr-10	0.20	0.01	0.25	0.02	0.02	0.02	0.02	2.24E-04	351	2.03E-02	4.07E-03	352	10.67	6,166	6.17
May-10	0.32	0.04	0.40	0.04	0.04	0.04	0.03	6.46E-04	475	3.21E-02	6.42E-03	478	14.60	9,721	12.72
Jun-10	0.39	0.06	0.50	0.05	0.05	0.05	0.03	8.72E-04	593	3.99E-02	7.99E-03	596	14.69	12,101	15.73
Jul-10	0.33	0.06	0.42	0.04	0.04	0.04	0.03	9.58E-04	487	3.39E-02	6.78E-03	490	14.09	10,271	13.97
Aug-10	0.43	0.08	0.55	0.05	0.05	0.05	0.04	1.14E-03	645	4.37E-02	8.74E-03	649	15.12	13,249	17.47
Sep-10	0.47	0.06	0.60	0.05	0.05	0.05	0.04	8.47E-04	706	4.78E-02	9.55E-03	710	15.45	14,473	19.01
Oct-10	0.52	0.06	0.66	0.06	0.06	0.06	0.04	8.60E-04	832	5.27E-02	1.05E-02	837	14.95	15,965	19.13
Nov-10	0.37	0.03	0.47	0.04	0.04	0.04	0.03	4.12E-04	644	3.79E-02	7.58E-03	647	10.42	11,484	12.55
Dec-10	0.52	0.05	0.66	0.06	0.06	0.06	0.04	7.96E-04	775	5.26E-02	1.05E-02	779	13.49	15,941	20.98
Jan-11	0.50	0.06	0.63	0.06	0.06	0.06	0.04	9.73E-04	802	5.04E-02	1.01E-02	806	12.69	15,286	18.18
Feb-11	0.30	0.04	0.38	0.03	0.03	0.03	0.02	5.59E-04	452	3.01E-02	6.02E-03	455	9.79	9,122	11.88
Mar-11	0.50	0.06	0.64	0.06	0.06	0.06	0.04	9.72E-04	790	5.10E-02	1.02E-02	794	15.20	15,454	19.40
Apr-11	0.27	0.07	0.65	0.06	0.06	0.06	0.04	9.82E-04	798	5.19E-02	1.04E-02	802	15.99	15,723	19.77
May-11	0.26	0.06	0.64	0.06	0.06	0.06	0.04	9.38E-04	764	5.14E-02	1.03E-02	768	15.26	15,583	20.49
Jun-11	0.26	0.06	0.64	0.06	0.06	0.06	0.04	8.39E-04	788	5.09E-02	1.02E-02	792	14.04	15,434	18.98

## Attachment B-9

### Baseline Actual Emission Calculations for DDU Charge Heater F-680

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	3.51	0.55	4.91	0.31	0.31	0.31	0.31	0.01	6,453	0.42	0.08	6,488	--	--	--
Monthly Maximum Throughput During Baseline:	15,965	20.98	15,965	11,557	11,557	11,557	15,965	20.98	20.98	20.98	20.98	20.98	15.99	15,965	20.98
Occurs:	Oct-10	Dec-10	Oct-10	Aug-09	Aug-09	Aug-09	Oct-10	Dec-10	Dec-10	Dec-10	Dec-10	Dec-10	Apr-11	Oct-10	Dec-10

#### Emission Factor References

- [1] Jan-08 through Oct-08: 5/5/05 stack test results of 0.049 lb/MMBtu.  
Nov-08 through Mar-11: 5/30/08 stack test results of 0.065 lb/MMBtu.  
Apr-11 through Jun-11: 3/8/11 stack test results of 0.034 lb/MMBtu.
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-10

### Projected Actual Emission Calculations for DDU Charge Heater F-680

Quantity	Value	Units	Reference
Projected Firing Rate:	13.84	Mscf/hr	Calculated
	15.00	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.065	lb/MMBtu	0.98	4.27	5/30/08 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	0.11	0.50	Calculated
CO	8.24E-02	lb/MMBtu	1.24	5.41	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	0.11	0.49	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	8.09E-02	0.35	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	1.72E-03	7.55E-03	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	1,965.31	8,608.05	2008-2011 Monitoring
CH <sub>4</sub> [4]	7.17	lb/MMscf	9.92E-02	0.43	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	1.98E-02	8.69E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	1,973.54	8,644.11	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or

Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor calculated from 2008-2011 monitoring data per Equation C-5 of 40 CFR 98

[4] Emission Factor = 0.003 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[5] Emission Factor = 0.0006 kg/MMBtu \* HHV \* 2.2 lb/kg per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-10

### Projected Actual Emission Calculations for DDU Charge Heater F-680

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	3.51	0.55	4.91	0.31	0.31	0.31	0.31	0.01	6,488	Attachment B-9
B. Capable of Accommodating	5.99	1.01	7.59	0.50	0.50	0.50	0.50	0.02	13,816	See below.
C. Projected Emissions	4.27	0.50	5.41	0.49	0.49	0.49	0.35	0.01	8,644	
D. Demand Growth (D=B-A)	2.47	0.45	2.67	0.19	0.19	0.19	0.19	0.01	7,328	
E. Projected Actual Emissions (E=C-D)	1.80	0.05	2.74	0.30	0.30	0.30	0.16	0.00	1,316	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	15,965	20.98	15,965	11,557	11,557	11,557	15,965	20.98	20.98	
Month that this occurred:	Oct-10	Dec-10	Oct-10	Aug-09	Aug-09	Aug-09	Oct-10	Dec-10	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	184,210	242.11	184,210	133,349	133,349	133,349	184,210	242.11	242.11	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.065	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	5.99	1.01	7.59	0.50	0.50	0.50	0.50	0.02	13,816	

# Attachment B-11

## Baseline Actual Emission Calculations for DDU Rerun Reboiler F-681

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.17	0.02	0.26	0.02	0.02	0.02	0.02	2.81E-04	285	0.02	4.19E-03	286	8.60	6,349	9.39
Feb-08	0.22	0.02	0.35	0.03	0.03	0.03	0.02	3.21E-04	414	0.03	5.60E-03	416	10.62	8,487	11.39
Mar-08	0.20	0.03	0.31	0.03	0.03	0.03	0.02	3.97E-04	340	0.03	5.04E-03	342	11.93	7,643	11.97
Apr-08	0.16	0.03	0.25	0.02	0.02	0.02	0.02	4.28E-04	269	0.02	4.06E-03	270	9.76	6,155	9.35
May-08	0.20	0.04	0.32	0.03	0.03	0.03	0.02	5.31E-04	346	0.03	5.15E-03	348	10.09	7,804	11.70
Jun-08	0.24	0.07	0.38	0.03	0.03	0.03	0.03	1.03E-03	478	0.03	6.16E-03	480	12.58	9,333	11.65
Jul-08	0.26	0.08	0.41	0.04	0.04	0.04	0.03	1.25E-03	489	0.03	6.63E-03	492	12.54	10,053	13.62
Aug-08	0.26	0.05	0.42	0.04	0.04	0.04	0.03	8.04E-04	461	0.03	6.70E-03	464	12.80	10,152	15.14
Sep-08	0.27	0.04	0.43	0.04	0.04	0.04	0.03	6.75E-04	473	0.03	6.89E-03	475	13.56	10,436	15.58
Oct-08	0.31	0.04	0.49	0.04	0.04	0.04	0.03	5.88E-04	571	0.04	7.79E-03	574	14.66	11,810	16.31
Nov-08	0.30	0.02	0.40	0.04	0.04	0.04	0.03	3.61E-04	484	0.03	6.41E-03	487	9.21	9,714	12.66
Dec-08	0.35	0.03	0.47	0.04	0.04	0.04	0.03	3.85E-04	584	0.04	7.52E-03	587	11.65	11,389	14.06
Jan-09	0.34	0.03	0.46	0.04	0.04	0.04	0.03	4.97E-04	593	0.04	7.33E-03	596	12.14	11,107	13.01
Feb-09	0.31	0.02	0.41	0.04	0.04	0.04	0.03	2.99E-04	512	0.03	6.61E-03	514	11.75	10,016	12.77
Mar-09	0.28	0.03	0.37	0.03	0.03	0.03	0.02	5.13E-04	479	0.03	6.01E-03	481	12.86	9,106	13.64
Apr-09	0.31	0.04	0.41	0.04	0.04	0.04	0.03	6.26E-04	491	0.03	6.58E-03	493	13.31	9,970	13.37
May-09	0.32	0.04	0.42	0.04	0.04	0.04	0.03	6.24E-04	503	0.03	6.72E-03	506	13.39	10,185	13.53
Jun-09	0.27	0.04	0.36	0.03	0.03	0.03	0.02	6.23E-04	418	0.03	5.81E-03	420	12.17	8,799	11.96
Jul-09	0.28	0.06	0.37	0.03	0.03	0.03	0.02	8.42E-04	456	0.03	6.23E-03	458	14.11	8,968	12.77
Aug-09	0.31	0.05	0.41	0.04	0.04	0.04	0.03	8.23E-04	487	0.03	6.50E-03	490	13.50	9,847	12.78
Sep-09	0.30	0.05	0.40	0.04	0.04	0.04	0.03	7.28E-04	487	0.03	6.46E-03	490	13.56	9,793	12.66
Oct-09	0.26	0.04	0.34	0.03	0.03	0.03	0.02	5.75E-04	419	0.03	5.46E-03	422	11.58	8,279	10.74
Nov-09	0.27	0.04	0.36	0.03	0.03	0.03	0.02	5.62E-04	426	0.03	5.73E-03	428	13.17	8,679	11.57
Dec-09	0.26	0.02	0.34	0.03	0.03	0.03	0.02	3.41E-04	459	0.03	5.50E-03	462	10.92	8,264	9.44
Jan-10	0.26	0.03	0.35	0.03	0.03	0.03	0.02	4.42E-04	407	0.03	5.27E-03	409	12.75	8,521	9.98
Feb-10	0.17	0.03	0.22	0.02	0.02	0.02	0.01	4.64E-04	261	0.02	3.58E-03	263	10.69	5,424	7.30
Mar-10	0.04	0.00	0.06	0.01	0.01	0.01	0.00	2.39E-05	82	0.00	9.32E-04	83	1.74	1,412	1.46
Apr-10	0.29	0.02	0.38	0.03	0.03	0.03	0.02	3.36E-04	525	0.03	6.10E-03	528	10.67	9,239	9.25
May-10	0.32	0.05	0.43	0.04	0.04	0.04	0.03	6.91E-04	508	0.03	6.86E-03	511	14.60	10,398	13.60
Jun-10	0.31	0.05	0.41	0.04	0.04	0.04	0.03	7.23E-04	492	0.03	6.63E-03	495	14.69	10,040	13.05
Jul-10	0.31	0.06	0.41	0.04	0.04	0.04	0.03	9.31E-04	474	0.03	6.59E-03	476	14.09	9,981	13.58
Aug-10	0.34	0.06	0.46	0.04	0.04	0.04	0.03	9.53E-04	539	0.04	7.31E-03	542	15.12	11,072	14.60
Sep-10	0.40	0.05	0.53	0.05	0.05	0.05	0.03	7.56E-04	630	0.04	8.52E-03	633	15.45	12,909	16.96
Oct-10	0.43	0.05	0.57	0.05	0.05	0.05	0.04	7.49E-04	725	0.05	9.18E-03	729	14.95	13,904	16.66
Nov-10	0.29	0.02	0.39	0.04	0.04	0.04	0.03	3.39E-04	530	0.03	6.24E-03	533	10.42	9,459	10.34
Dec-10	0.34	0.04	0.45	0.04	0.04	0.04	0.03	5.50E-04	536	0.04	7.28E-03	539	13.49	11,025	14.51
Jan-11	0.37	0.05	0.49	0.04	0.04	0.04	0.03	7.56E-04	623	0.04	7.84E-03	626	12.69	11,880	14.13
Feb-11	0.21	0.03	0.27	0.02	0.02	0.02	0.02	4.06E-04	329	0.02	4.38E-03	331	9.79	6,634	8.64
Mar-11	0.39	0.05	0.52	0.05	0.05	0.05	0.03	7.90E-04	642	0.04	8.29E-03	646	15.20	12,567	15.77
Apr-11	0.28	0.05	0.48	0.04	0.04	0.04	0.03	7.21E-04	586	0.04	7.62E-03	589	15.99	11,551	14.53
May-11	0.28	0.05	0.47	0.04	0.04	0.04	0.03	6.82E-04	555	0.04	7.47E-03	558	15.26	11,322	14.89
Jun-11	0.26	0.04	0.44	0.04	0.04	0.04	0.03	5.77E-04	542	0.04	7.01E-03	545	14.04	10,619	13.06



# Attachment B-11

## Baseline Actual Emission Calculations for DDU Rerun Reboiler F-681

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Distillate	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	3.51	0.49	4.61	0.41	0.41	0.41	0.31	0.01	5,799	0.38	0.08	5,830	--	--	--
Monthly Maximum Throughput During Baseline:	13,904	16.96	13,904	11,810	11,810	11,810	13,904	16.96	16.96	16.96	16.96	16.96	15.99	13,904	16.96
Occurs:	Oct-10	Sep-10	Oct-10	Oct-08	Oct-08	Oct-08	Oct-10	Sep-10	Sep-10	Sep-10	Sep-10	Sep-10	Apr-11	Oct-10	Sep-10

### Emission Factor References

- [1] Jan-08 through Oct-08: 5/10/05 stack test results of 0.052 lb/MMBtu.  
Nov-08 through Mar-11: 10/24/08 stack test results of 0.062 lb/MMBtu.  
Apr-11 through Jun-11: 3/8/11 stack test results of 0.049 lb/MMBtu.
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
GHG mass (tons) = CO<sub>2</sub> (tons) + CH<sub>4</sub> (tons) + N<sub>2</sub>O (tons).
- [10] Measured throughput rates.

## Attachment B-12

### Projected Actual Emission Calculations for DDU Rerun Reboiler F-681

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Projected Firing Rate:	18.45	Mscf/hr	Calculated
	20.00	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.062	lb/MMBtu	1.24	5.43	10/24/08 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	0.15	0.67	Calculated
CO	8.24E-02	lb/MMBtu	1.65	7.21	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	0.15	0.65	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.11	0.47	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	2.30E-03	1.01E-02	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	2,620.41	11,477.39	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	7.17	lb/MMscf	0.13	0.58	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	2.65E-02	0.12	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	2,631.39	11,525.48	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times \text{CC} \times \text{MW} / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-12

### Projected Actual Emission Calculations for DDU Rerun Reboiler F-681

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	GHG tpy CO2e	Reference
A. Baseline Actual Emissions	3.51	0.49	4.61	0.41	0.41	0.41	0.31	7.40E-03	5,830	Attachment B-11
B. Capable of Accommodating	4.97	0.84	6.61	0.51	0.51	0.51	0.43	1.26E-02	11,538	See below.
C. Projected Emissions	5.43	0.67	7.21	0.65	0.65	0.65	0.47	1.01E-02	11,525	
D. Demand Growth (D=B-A)	1.46	0.35	2.00	0.10	0.10	0.10	0.13	5.19E-03	5,708	
E. Projected Actual Emissions (E=C-D)	3.97	0.33	5.22	0.56	0.56	0.56	0.34	4.88E-03	5,818	
F. Emission Increase (F=E-A)	0.46	0.00	0.61	0.15	0.15	0.15	0.04	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	13,904	16.96	13,904	11,810	11,810	11,810	13,904	16.96	16.96	
Month that this occurred:	Oct-10	Sep-10	Oct-10	Oct-08	Oct-08	Oct-08	Oct-10	Sep-10	Sep-10	
Throughput that Unit was Capable of Accommodating (Units/year)	160,434	202.19	160,434	136,274	136,274	136,274	160,434	202.19	202.19	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.062	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	4.97	0.84	6.61	0.51	0.51	0.51	0.43	0.01	11,538	

## Attachment B-13

## Baseline Actual Emission Calculations for SRU/TGI

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Sulfur Feed Rate	Sour Gas Flow	Fuel Gas Firing		SO <sub>2</sub> 24-mo Rolling
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	LT	Mscf	MMBtu	MMscf	tpy
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[11]
Jan-08	0.10	26.70	0.08	7.64E-03	7.64E-03	7.64E-03	5.53E-03	0.27	269	6.77E-03	1.35E-03	269	278	15,461	2,052	3.04	
Feb-08	0.10	28.41	0.09	7.88E-03	7.88E-03	7.88E-03	5.70E-03	0.28	266	6.98E-03	1.40E-03	267	260	14,279	2,116	2.84	
Mar-08	0.09	34.33	0.08	7.22E-03	7.22E-03	7.22E-03	5.22E-03	0.34	267	6.40E-03	1.28E-03	268	305	15,834	1,938	3.04	
Apr-08	0.09	25.12	0.08	7.21E-03	7.21E-03	7.21E-03	5.22E-03	0.25	240	6.38E-03	1.28E-03	241	266	13,618	1,934	2.94	
May-08	0.10	13.83	0.08	7.55E-03	7.55E-03	7.55E-03	5.46E-03	0.14	268	6.68E-03	1.34E-03	269	299	15,617	2,026	3.04	
Jun-08	0.12	19.81	0.10	8.77E-03	8.77E-03	8.77E-03	6.35E-03	0.20	302	7.77E-03	1.55E-03	303	320	15,915	2,354	2.94	
Jul-08	0.11	15.11	0.09	8.35E-03	8.35E-03	8.35E-03	6.04E-03	0.15	300	7.40E-03	1.48E-03	301	342	16,743	2,241	3.04	
Aug-08	0.10	20.05	0.08	7.58E-03	7.58E-03	7.58E-03	5.49E-03	0.20	281	6.72E-03	1.34E-03	282	332	16,555	2,035	3.04	
Sep-08	0.10	24.99	0.08	7.33E-03	7.33E-03	7.33E-03	5.30E-03	0.25	273	6.49E-03	1.30E-03	273	312	16,077	1,968	2.94	
Oct-08	0.11	25.86	0.09	8.19E-03	8.19E-03	8.19E-03	5.93E-03	0.26	305	7.25E-03	1.45E-03	305	345	17,367	2,198	3.04	
Nov-08	0.11	22.86	0.09	8.40E-03	8.40E-03	8.40E-03	6.08E-03	0.23	268	7.44E-03	1.49E-03	269	263	13,669	2,254	2.94	
Dec-08	0.12	20.54	0.10	9.16E-03	9.16E-03	9.16E-03	6.63E-03	0.21	287	8.12E-03	1.62E-03	287	271	14,066	2,459	3.04	
Jan-09	0.13	24.54	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.25	302	8.55E-03	1.71E-03	302	288	14,303	2,591	3.04	
Feb-09	0.11	22.03	0.09	8.01E-03	8.01E-03	8.01E-03	5.80E-03	0.22	235	7.10E-03	1.42E-03	236	214	10,983	2,151	2.74	
Mar-09	0.10	25.00	0.08	7.55E-03	7.55E-03	7.55E-03	5.46E-03	0.25	255	6.69E-03	1.34E-03	256	279	13,031	2,026	3.04	
Apr-09	0.11	29.13	0.09	8.16E-03	8.16E-03	8.16E-03	5.91E-03	0.29	283	7.23E-03	1.45E-03	283	313	15,312	2,191	2.94	
May-09	0.11	38.82	0.09	8.51E-03	8.51E-03	8.51E-03	6.16E-03	0.39	308	7.54E-03	1.51E-03	308	359	17,058	2,285	3.04	
Jun-09	0.11	33.50	0.09	8.05E-03	8.05E-03	8.05E-03	5.83E-03	0.33	273	7.13E-03	1.43E-03	274	316	14,919	2,161	2.94	
Jul-09	0.10	33.31	0.09	7.94E-03	7.94E-03	7.94E-03	5.75E-03	0.33	289	7.41E-03	1.48E-03	289	334	15,795	2,132	3.04	
Aug-09	0.11	32.99	0.10	8.71E-03	8.71E-03	8.71E-03	6.30E-03	0.33	295	7.72E-03	1.54E-03	296	321	15,733	2,338	3.04	
Sep-09	0.11	30.55	0.09	8.47E-03	8.47E-03	8.47E-03	6.13E-03	0.31	290	7.50E-03	1.50E-03	291	318	15,487	2,273	2.94	
Oct-09	0.11	31.13	0.10	8.71E-03	8.71E-03	8.71E-03	6.31E-03	0.31	286	7.72E-03	1.54E-03	286	298	14,640	2,339	3.04	
Nov-09	0.11	29.73	0.09	8.21E-03	8.21E-03	8.21E-03	5.94E-03	0.30	266	7.27E-03	1.45E-03	267	285	13,830	2,204	2.94	
Dec-09	0.13	25.60	0.11	9.90E-03	9.90E-03	9.90E-03	7.16E-03	0.26	296	8.83E-03	1.77E-03	296	259	12,965	2,656	3.04	316.99
Jan-10	0.13	31.52	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.32	276	8.01E-03	1.60E-03	276	270	13,310	2,591	3.04	319.39
Feb-10	0.10	23.48	0.08	7.59E-03	7.59E-03	7.59E-03	5.50E-03	0.23	227	6.73E-03	1.35E-03	227	243	11,270	2,038	2.74	316.92
Mar-10	0.14	13.17	0.12	1.09E-02	1.09E-02	1.09E-02	7.89E-03	0.13	238	9.66E-03	1.93E-03	239	116	5,880	2,927	3.04	306.34
Apr-10	0.14	14.56	0.12	1.09E-02	1.09E-02	1.09E-02	7.91E-03	0.15	280	9.68E-03	1.94E-03	280	200	9,872	2,934	2.94	301.06
May-10	0.11	16.08	0.10	8.64E-03	8.64E-03	8.64E-03	6.26E-03	0.16	268	7.66E-03	1.53E-03	269	269	13,566	2,320	3.04	302.18
Jun-10	0.11	15.44	0.09	8.42E-03	8.42E-03	8.42E-03	6.09E-03	0.15	265	7.46E-03	1.49E-03	266	261	13,531	2,260	2.94	300.00
Jul-10	0.11	12.96	0.09	8.31E-03	8.31E-03	8.31E-03	6.02E-03	0.13	272	7.36E-03	1.47E-03	272	275	14,523	2,231	3.04	298.93
Aug-10	0.11	11.28	0.09	8.58E-03	8.58E-03	8.58E-03	6.21E-03	0.11	284	7.60E-03	1.52E-03	285	291	15,069	2,303	3.04	294.55
Sep-10	0.11	18.95	0.09	8.13E-03	8.13E-03	8.13E-03	5.89E-03	0.19	266	7.20E-03	1.44E-03	267	273	13,972	2,183	2.87	291.52
Oct-10	0.13	19.05	0.11	9.65E-03	9.65E-03	9.65E-03	6.99E-03	0.19	305	8.55E-03	1.71E-03	306	301	14,862	2,591	3.11	288.12
Nov-10	0.13	11.50	0.11	1.02E-02	1.02E-02	1.02E-02	7.36E-03	0.12	296	9.00E-03	1.80E-03	297	231	12,518	2,728	2.98	282.44
Dec-10	0.12	9.89	0.10	8.79E-03	8.79E-03	8.79E-03	6.36E-03	0.10	257	7.79E-03	1.56E-03	258	227	12,450	2,360	3.11	277.11
Jan-11	0.13	10.61	0.11	9.69E-03	9.69E-03	9.69E-03	7.01E-03	0.11	266	8.58E-03	1.72E-03	267	225	11,384	2,600	3.09	270.14
Feb-11	0.11	12.38	0.09	8.06E-03	8.06E-03	8.06E-03	5.83E-03	0.12	220	7.14E-03	1.43E-03	221	211	9,910	2,163	2.82	265.31
Mar-11	0.12	13.16	0.10	9.05E-03	9.05E-03	9.05E-03	6.55E-03	0.13	297	8.02E-03	1.60E-03	298	295	15,156	2,431	3.05	259.39
Apr-11	0.12	15.52	0.10	8.75E-03	8.75E-03	8.75E-03	6.34E-03	0.16	291	7.76E-03	1.55E-03	291	292	15,005	2,350	2.95	252.59
May-11	0.11	17.74	0.09	8.42E-03	8.42E-03	8.42E-03	6.10E-03	0.18	290	7.46E-03	1.49E-03	290	313	15,655	2,261	2.97	242.05
Jun-11	0.11	9.65	0.09	8.25E-03	8.25E-03	8.25E-03	5.97E-03	0.10	270	7.31E-03	1.46E-03	271	264	13,784	2,214	2.72	230.12

**Attachment B-13**  
**Baseline Actual Emission Calculations for SRU/TGI**

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Sulfur Feed	Sour Gas	Fuel Gas Firing		SO <sub>2</sub>
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	LT	Mscf	MMBtu	MMscf	24-mo Rolling
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[11]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--	--	--
Baseline Actual Emissions:	1.39	242.05	1.17	0.10	0.10	0.10	0.08	2.42	3,296	0.09	0.02	3,304	--	--	--	--	--
Monthly Maximum Throughput During Baseline:	2,934	3.11	2,934	2,934	2,934	2,934	2,934	15,795	3.11	3.11	3.11	3.11	359.38	17,367	2,934	3.11	319.39
Occurs:	Apr-10	Dec-10	Apr-10	Apr-10	Apr-10	Apr-10	Apr-10	Jul-09	Dec-10	Dec-10	Dec-10	Dec-10	May-09	Oct-08	Apr-10	Dec-10	Jan-10

**References**

- [1] Emission factor of 0.0980 lb/MMBtu per AP-42 Table 1.4-1.  
[2] Based on CEMS data.  
[3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.  
[4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.  
[5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.  
[6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.  
[7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.  
[8] Assumed to be 1% of total SO<sub>2</sub> emissions consistent with TRI reporting.  
[9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98 + (Sour Gas Flow) \* 44 / (849.5 scf/kg-mol) \* 0.20 \* 2.2 lb/kg / 2000 lb/ton per Equation Y-12 of 40 CFR 98.  
CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons)  
[10] Based on provided throughput rates.  
[11] 24-month rolling annual average SO<sub>2</sub> emissions calculated from monthly SO<sub>2</sub> emissions.

## Attachment B-14

### Projected Actual Emission Calculations for SRU/TGI

Quantity	Value	Units	Reference
Projected Firing Rate:	4.19	Mscf/hr	Engineering estimate
	4.54	MMBtu/hr	Calculated
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
SO2 Emissions:	60	tpy	Engineering estimate
Sour Gas Flow:	153,226	Mscf/yr	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	9.80E-02	lb/MMBtu	0.45	1.95	AP-42 Table 1.4-2
SO <sub>2</sub>	--	--	13.70	60.00	Engineering estimate
CO	8.24E-02	lb/MMBtu	0.37	1.64	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	3.38E-02	0.15	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	3.38E-02	0.15	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	3.38E-02	0.15	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	2.45E-02	0.11	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	--	--	0.14	0.60	TRI calculation (1% of SO2 emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	594.98	2,606.00	40 CFR 98 Subpart C
	22.79	lb/Mscf sour gas	398.63	1,746.00	40 CFR 98 Subpart Y
CH <sub>4</sub> [4]	7.17	lb/MMscf	3.00E-02	0.13	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	6.01E-03	2.63E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	--	--	996.10	4,362.91	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times \text{CC} \times \text{MW} / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98  
 Emission Factor =  $44 / (849.5 \text{ scf/kg-mol}) \times 0.20 \times 1000 \text{ scf/Mscf} \times 2.2 \text{ lb/kg}$  per Equation Y-12 of 40 CFR 98.

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

**Attachment B-14**  
**Projected Actual Emission Calculations for SRU/TGI**

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	1.39	242.05	1.17	0.10	0.10	0.10	0.08	2.42	3,304	Attachment B-13
B. Capable of Accommodating	1.71	N/A	1.44	0.13	0.13	0.13	0.09	2.90	4,633	See below.
C. Projected Emissions	1.95	60.00	1.64	0.15	0.15	0.15	0.11	0.60	4,363	
D. Demand Growth (D=B-A)	0.32	N/A	0.27	0.03	0.03	0.03	0.02	0.48	1,329	
E. Projected Actual Emissions (E=C-D)	1.63	60.00	1.37	0.12	0.12	0.12	0.09	0.12	3,034	
F. Emission Increase (F=E-A)	0.24	0.00	0.20	0.02	0.02	0.02	0.01	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	613.2	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	2,934	--	2,934	2,934	2,934	2,934	2,934	15,795	3.11	
Month that this occurred:	Apr-10	--	Apr-10	Apr-10	Apr-10	Apr-10	Apr-10	Jul-09	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	34,984	--	34,984	34,984	34,984	34,984	34,984	182,256	35.85	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.098	--	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.03	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	Mscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	1.71	N/A	1.44	0.13	0.13	0.13	0.09	2.90	4,633	GHGs includes fuel gas firing and sour gas.

Annualized rate assumes a 95% capacity factor to account for unit downtime.

A federally enforceable emission limit of 60 tons of SO2 per year will be taken. Calculations are therefore on a baseline actual-to-potential basis.

SO2 emission reductions from installation of a tail gas treatment unit, a separate contemporaneous project, are included as part of the netting analysis.

Baseline Actual Emissions: 319.39 tpy BAE is defined for a different time period for this separate contemporaneous project.  
Proposed Emission Limit: 60.00 tpy  
Net Change in Emissions: -259.39 tpy

# Attachment B-15

## Baseline Actual Emission Calculations for FGDU/SWS (SRU) Flare

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Sour Gas Flow
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	Mscf
	[1]	[2]	[1]	[1]	[1]	[1]	[1]	[3]	[4]	[1]	[1]	[4]	[5]
Jan-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-08	0	0	0	0	0	0	0	0	0	0	0	0	0
May-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-08	0	6.20E-02	0	0	0	0	0	6.20E-04	1.20E-02	0	0	1.20E-02	1.05
Dec-08	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-09	0	0.20	0	0	0	0	0	2.01E-03	4.10E-02	0	0	4.10E-02	3.59
Apr-09	0	0	0	0	0	0	0	0	0	0	0	0	0
May-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-09	0	0.17	0	0	0	0	0	1.65E-03	3.19E-02	0	0	3.19E-02	2.80
Aug-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-09	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-10	0	0	0	0	0	0	0	0	0	0	0	0	0
May-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Aug-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Sep-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Nov-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-10	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-11	0	0	0	0	0	0	0	0	0	0	0	0	0
May-11	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-11	0	0	0	0	0	0	0	0	0	0	0	0	0



# Attachment B-15

## Baseline Actual Emission Calculations for FGDU/SWS (SRU) Flare

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Sour Gas Flow
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	Mscf
Date	[1]	[2]	[1]	[1]	[1]	[1]	[1]	[3]	[4]	[1]	[1]	[4]	[5]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--
Baseline Actual Emissions:	0.00	0.08	0.00	0.00	0.00	0.00	0.00	8.25E-04	1.60E-02	0.00	0.00	1.60E-02	--
Monthly Maximum Throughput During Baseline:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	3.59
Occurs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Mar-09

### Emission Factor References

- [1] No emissions of this pollutant from the FGDU/SWS Flare.
- [2] Non-routine emission events on 11/8/08, 3/4/09, 7/28/09.
- [3] Assumed to be 1% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [4] Calculated as follows: CO<sub>2</sub> (tons) = (Sour Gas Flow) \* 44 / (849.5 scf/kg-mol) \* 0.20 \* 2.2 lb/kg / 2000 lb/ton per Equation Y-12 of 40 CFR 98.  
CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons)
- [5] Measured throughput rates.

## Attachment B-16

### Projected Actual Emission Calculations for FGDU/SWS (SRU) Flare

Quantity	Value	Units	Reference
Projected Sour Gas Rate:	15.9	Mscf/hr	Engineering estimate, based on 2002 flaring event
Hours of Operation:	22.2	hr/yr	Engineering estimate (two times larger than 2002 event)

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0	--	0	0	--
SO <sub>2</sub>	87.26	lb/Mscf sour gas	1,387	15.40	Based on 2002 flaring event
CO	0	--	0	0	--
PM	0	--	0	0	--
PM <sub>10</sub>	0	--	0	0	--
PM <sub>2.5</sub>	0	--	0	0	--
VOC	0	--	0	0	--
H <sub>2</sub> SO <sub>4</sub>	0.87	lb/Mscf sour gas	13.87	0.15	TRI calculation (1% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	22.79	lb/Mscf sour gas	362	4.02	40 CFR 98 Subpart Y
CH <sub>4</sub>	0	--	0	0	--
N <sub>2</sub> O	0	--	0	0	--
CO <sub>2</sub> e [4]	22.79	lb/Mscf sour gas	362	4.02	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/Mscf) x Projected Sour Gas Rate (Mscf/hr) or

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-16

### Projected Actual Emission Calculations for FGDU/SWS (SRU) Flare

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02	Attachment B-15
B. Capable of Accommodating	0.00	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.07	See below.
C. Projected Emissions	0.00	15.40	0.00	0.00	0.00	0.00	0.00	0.15	4.02	
D. Demand Growth (D=B-A)	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.06	
E. Projected Actual Emissions (E=C-D)	0.00	15.12	0.00	0.00	0.00	0.00	0.00	0.15	3.97	
F. Emission Increase (F=E-A)	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	3.95	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Month that this occurred:	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Units	N/A	--	N/A	N/A	N/A	N/A	N/A	--	--	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	0	0.37	0	0	0	0	0	0.00	0.07	See below.

Calendar year 2009 is used to represent the emissions the unit was capable of accommodating during the baseline period.

# Attachment B-17

## Baseline Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Gasoline	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Feb-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Mar-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Apr-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
May-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Jun-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Jul-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Aug-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Sep-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Oct-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Nov-08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0.00	0	0.00	0	0.00
Dec-08	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	163	0.01	0.00	163	1.77	3,171	3.91
Jan-09	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	174	0.01	0.00	175	3.52	3,257	3.82
Feb-09	0.06	0.00	0.07	0.01	0.01	0.01	0.00	0.00	88	0.01	0.00	89	4.09	1,726	2.20
Mar-09	0.06	0.01	0.06	0.01	0.01	0.01	0.00	0.00	78	0.00	0.00	79	4.41	1,492	2.24
Apr-09	0.09	0.01	0.09	0.01	0.01	0.01	0.01	0.00	113	0.01	0.00	114	6.18	2,304	3.09
May-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	111	6.95	2,241	2.98
Jun-09	0.09	0.01	0.10	0.01	0.01	0.01	0.01	0.00	114	0.01	0.00	115	6.65	2,408	3.27
Jul-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	114	0.01	0.00	115	5.88	2,244	3.20
Aug-09	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	130	0.01	0.00	131	6.32	2,635	3.42
Sep-09	0.07	0.01	0.08	0.01	0.01	0.01	0.01	0.00	97	0.01	0.00	98	4.95	1,950	2.52
Oct-09	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	133	0.01	0.00	134	4.77	2,628	3.41
Nov-09	0.08	0.01	0.09	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	112	3.92	2,270	3.03
Dec-09	0.05	0.00	0.05	0.00	0.00	0.00	0.00	0.00	73	0.00	0.00	74	1.54	1,316	1.50
Jan-10	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	124	0.01	0.00	124	3.37	2,587	3.03
Feb-10	0.09	0.01	0.10	0.01	0.01	0.01	0.01	0.00	111	0.01	0.00	112	4.20	2,309	3.11
Mar-10	0.06	0.00	0.07	0.01	0.01	0.01	0.00	0.00	98	0.01	0.00	99	3.12	1,682	1.74
Apr-10	0.13	0.01	0.14	0.01	0.01	0.01	0.01	0.00	193	0.01	0.00	194	4.96	3,392	3.40
May-10	0.12	0.01	0.13	0.01	0.01	0.01	0.01	0.00	153	0.01	0.00	154	6.12	3,127	4.09
Jun-10	0.12	0.02	0.14	0.01	0.01	0.01	0.01	0.00	164	0.01	0.00	165	6.84	3,352	4.36
Jul-10	0.12	0.02	0.14	0.01	0.01	0.01	0.01	0.00	158	0.01	0.00	159	6.51	3,322	4.52
Aug-10	0.13	0.02	0.14	0.01	0.01	0.01	0.01	0.00	167	0.01	0.00	168	6.31	3,422	4.51
Sep-10	0.10	0.01	0.11	0.01	0.01	0.01	0.01	0.00	136	0.01	0.00	137	5.26	2,786	3.66
Oct-10	0.12	0.01	0.14	0.01	0.01	0.01	0.01	0.00	175	0.01	0.00	176	5.43	3,361	4.03
Nov-10	0.17	0.01	0.19	0.02	0.02	0.02	0.01	0.00	259	0.02	0.00	260	6.27	4,615	5.04
Dec-10	0.13	0.01	0.14	0.01	0.01	0.01	0.01	0.00	170	0.01	0.00	171	4.68	3,490	4.59
Jan-11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6	0.00	0.00	6	0.00	110	0.13
Feb-11	0.03	0.00	0.03	0.00	0.00	0.00	0.00	0.00	35	0.00	0.00	35	0.59	710	0.92
Mar-11	0.15	0.02	0.16	0.01	0.01	0.01	0.01	0.00	203	0.01	0.00	204	5.42	3,965	4.98
Apr-11	0.15	0.02	0.17	0.02	0.02	0.02	0.01	0.00	210	0.01	0.00	211	6.46	4,138	5.20
May-11	0.16	0.02	0.18	0.02	0.02	0.02	0.01	0.00	217	0.01	0.00	218	6.96	4,422	5.82
Jun-11	0.16	0.02	0.17	0.02	0.02	0.02	0.01	0.00	215	0.01	0.00	216	7.26	4,216	5.18

# Attachment B-17

## Baseline Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Gasoline	Fuel Gas Firing	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	1.18	0.14	1.23	0.08	0.08	0.08	0.09	0.00	1,675	0.11	0.02	1,684	--	--	--
Monthly Maximum Throughput During Baseline:	4,615	5.82	4,615	3,392	3,392	3,392	4,615	5.82	5.82	5.82	5.82	5.82	6.95	4,615	5.20
Occurs:	Nov-10	May-11	Nov-10	Apr-10	Apr-10	Apr-10	Nov-10	May-11	May-11	May-11	May-11	May-11	May-09	Nov-10	Apr-11

### Emission Factor References

- [1] 4/1/09 stack test results (0.074 lb/MMBtu).
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.0824 lb/MMBtu per AP-42 Table 1.4-1.
- [4] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [5] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [6] Emission factor of 7.45E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [7] Emission factor of 5.39E-03 lb/MMBtu per AP-42 Table 1.4-2.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
 CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rates.

## Attachment B-18

### Projected Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

Quantity	Value	Units	Reference
Projected Firing Rate:	3.74	Mscf/hr	Calculated
	4.05	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.074	lb/MMBtu	0.30	1.31	4/1/09 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	3.11E-02	0.14	Calculated
CO	8.24E-02	lb/MMBtu	0.33	1.46	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	3.02E-02	0.13	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	3.02E-02	0.13	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	3.02E-02	0.13	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	2.19E-02	9.57E-02	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	4.66E-04	2.04E-03	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	531.16	2,326.47	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	7.17	lb/MMscf	2.68E-02	0.12	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	5.36E-03	2.35E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	533.38	2,336.22	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or

Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-18

### Projected Actual Emission Calculations for Gasoline Hydrotreater (GHT) Unit F-701

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	1.18	0.14	1.23	0.08	0.08	0.08	0.09	0.00	1,684	Attachment B-11
B. Capable of Accommodating	2.04	0.28	2.27	0.15	0.15	0.15	0.15	4.18E-03	3,829	See below.
C. Projected Emissions	1.31	0.14	1.46	0.13	0.13	0.13	0.10	0.00	2,336	
D. Demand Growth (D=B-A)	0.86	0.14	1.04	0.07	0.07	0.07	0.06	0.00	2,145	
E. Projected Actual Emissions (E=C-D)	0.45	0.00	0.43	0.06	0.06	0.06	0.03	0.00	191	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	4,615	5.82	4,615	3,392	3,392	3,392	4,615	5.82	5.82	
Month that this occurred:	Nov-10	May-11	Nov-10	Apr-10	Apr-10	Apr-10	Nov-10	May-11	May-11	
Throughput that Unit was Capable of Accommodating (Units/year)	55,024	67.10	55,024	40,448	40,448	40,448	55,024	67.10	67.10	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	0.074	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMBtu	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	2.04	0.28	2.27	0.15	0.15	0.15	0.15	0.00	3,829	

# Attachment B-19

## Baseline Actual Emission Calculations for Ultraformer Compressors (K1s)

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Firing	Operation
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMscf	Hours
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Jan-08	1.33	8.13E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.12E-03	1.82E-03	161	9.99	2.62	1,480
Feb-08	1.25	7.64E-04	0.42	0.03	0.03	0.03	0.04	0	151	8.58E-03	1.72E-03	152	9.31	2.47	1,392
Mar-08	1.33	8.12E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.11E-03	1.82E-03	161	10.32	2.62	1,478
Apr-08	1.30	7.91E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.88E-03	1.78E-03	157	10.23	2.55	1,440
May-08	1.34	8.17E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.17E-03	1.83E-03	162	10.29	2.64	1,488
Jun-08	1.28	7.83E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.79E-03	1.76E-03	155	9.65	2.53	1,426
Jul-08	1.34	8.15E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.15E-03	1.83E-03	162	9.92	2.63	1,484
Aug-08	1.30	7.90E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.87E-03	1.77E-03	157	9.55	2.55	1,439
Sep-08	1.28	7.83E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.78E-03	1.76E-03	155	9.17	2.53	1,425
Oct-08	1.32	8.06E-04	0.44	0.03	0.03	0.03	0.04	0	159	9.05E-03	1.81E-03	160	8.24	2.60	1,468
Nov-08	1.25	7.65E-04	0.42	0.03	0.03	0.03	0.04	0	151	8.59E-03	1.72E-03	152	7.81	2.47	1,393
Dec-08	1.34	8.17E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.17E-03	1.83E-03	162	7.59	2.64	1,488
Jan-09	1.32	8.12E-04	0.44	0.03	0.03	0.03	0.04	0	159	9.11E-03	1.82E-03	160	7.90	2.65	1,471
Feb-09	1.13	6.92E-04	0.38	0.02	0.02	0.02	0.03	0	136	7.77E-03	1.55E-03	136	8.42	2.26	1,254
Mar-09	1.33	8.17E-04	0.44	0.03	0.03	0.03	0.04	0	160	9.17E-03	1.83E-03	161	10.06	2.67	1,481
Apr-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	9.59	2.60	1,440
May-09	1.34	8.21E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.22E-03	1.84E-03	162	10.16	2.68	1,488
Jun-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	10.31	2.60	1,440
Jul-09	1.34	8.21E-04	0.45	0.03	0.03	0.03	0.04	0	161	9.22E-03	1.84E-03	162	10.44	2.68	1,488
Aug-09	1.33	8.19E-04	0.44	0.03	0.03	0.03	0.04	0	161	9.19E-03	1.84E-03	161	9.52	2.67	1,483
Sep-09	1.30	7.95E-04	0.43	0.03	0.03	0.03	0.04	0	156	8.92E-03	1.78E-03	157	9.95	2.60	1,440
Oct-09	1.22	7.51E-04	0.41	0.02	0.02	0.02	0.04	0	147	8.43E-03	1.69E-03	148	9.09	2.45	1,361
Nov-09	1.28	7.85E-04	0.43	0.03	0.03	0.03	0.04	0	154	8.82E-03	1.76E-03	155	9.48	2.57	1,423
Dec-09	0.97	5.94E-04	0.32	0.02	0.02	0.02	0.03	0	117	6.67E-03	1.33E-03	117	5.65	1.94	1,077
Jan-10	1.32	9.71E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.18E-03	191	9.70	3.18	1,472
Feb-10	1.21	8.87E-04	0.40	0.03	0.03	0.03	0.04	0	174	9.95E-03	1.99E-03	175	9.98	2.90	1,344
Mar-10	0.24	1.73E-04	0.08	0.01	0.01	0.01	0.01	0	34	1.94E-03	3.88E-04	34	1.25	0.57	262
Apr-10	1.01	7.41E-04	0.34	0.02	0.02	0.02	0.04	0	145	8.32E-03	1.66E-03	146	7.05	2.43	1,124
May-10	1.32	9.70E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.18E-03	191	10.74	3.17	1,470
Jun-10	1.29	9.48E-04	0.43	0.03	0.03	0.03	0.05	0	186	1.06E-02	2.13E-03	187	10.39	3.10	1,437
Jul-10	1.32	9.68E-04	0.44	0.03	0.03	0.03	0.05	0	190	1.09E-02	2.17E-03	191	10.75	3.17	1,467
Aug-10	1.34	9.80E-04	0.45	0.03	0.03	0.03	0.05	0	192	1.10E-02	2.20E-03	193	10.87	3.21	1,486
Sep-10	1.15	8.43E-04	0.38	0.03	0.03	0.03	0.04	0	165	9.46E-03	1.89E-03	166	10.57	2.76	1,278
Oct-10	1.30	9.53E-04	0.43	0.03	0.03	0.03	0.05	0	187	1.07E-02	2.14E-03	188	10.09	3.12	1,444
Nov-10	1.10	8.05E-04	0.37	0.03	0.03	0.03	0.04	0	158	9.03E-03	1.81E-03	159	7.84	2.63	1,220
Dec-10	1.34	9.82E-04	0.45	0.03	0.03	0.03	0.05	0	192	1.10E-02	2.20E-03	193	10.24	3.21	1,488
Jan-11	1.29	8.62E-04	0.43	0.03	0.03	0.03	0.04	0	169	9.68E-03	1.94E-03	170	9.00	2.82	1,431
Feb-11	1.20	8.00E-04	0.40	0.03	0.03	0.03	0.04	0	157	8.98E-03	1.80E-03	158	9.46	2.62	1,328
Mar-11	1.31	8.74E-04	0.44	0.03	0.03	0.03	0.04	0	172	9.81E-03	1.96E-03	172	10.11	2.86	1,451
Apr-11	1.29	8.61E-04	0.43	0.03	0.03	0.03	0.04	0	169	9.67E-03	1.93E-03	170	9.98	2.82	1,430
May-11	1.33	8.91E-04	0.44	0.03	0.03	0.03	0.04	0	175	1.00E-02	2.00E-03	176	9.85	2.92	1,479
Jun-11	1.18	7.93E-04	0.39	0.03	0.03	0.03	0.04	0	156	8.90E-03	1.78E-03	156	9.25	2.60	1,316



## Attachment B-19

### Baseline Actual Emission Calculations for Ultraformer Compressors (K1s)

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	UFU	Firing	Operation
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MBPD	MMscf	Hours
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	14.55	0.01	4.86	0.31	0.31	0.31	0.49	0	1,948	0.11	0.02	1,957	--	--	--
Monthly Maximum Throughput During Baseline:	1,488	3.21	1,488	3.18	3.18	3.18	3.21	3.21	3.21	3.21	3.21	3.21	10.87	3.21	1,488
Occurs:	May-08	Dec-10	May-08	Jan-10	Jan-10	Jan-10	Dec-10	Dec-10	Dec-10	Dec-10	Dec-10	Dec-10	Aug-10	Dec-10	May-08

#### Emission Factor References

- [1] 12/9/93 stack test results (1.8 lb/hr).
- [2] Emission factor of 5.88E-04 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
- [3] 12/9/93 stack test results (0.6 lb/hr).
- [4] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
- [5] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
- [6] Emission factor of 1.941E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
- [7] Emission factor of 2.96E-02 lb/MMBtu converted to lb/MMscf using the HHV of natural gas per AP-42 Table 3.2-3.
- [8] Assumed to be negligible.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
 CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Measured throughput rate and hours of operation. Monthly firing rates estimated using annual firing rates and monthly hours of operation.

## Attachment B-20

### Projected Actual Emission Calculations for Ultraformer Compressors (K1s)

Quantity	Value	Units	Reference
Projected Firing Rate:	4.32	Mscf/hr	Engineering estimate (total firing of 2 compressors)
	4.50	MMBtu/hr	Calculated
Fuel HHV:	1043	Btu/scf	2008-2011 monitoring
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	1.80	lb/hr/compressor	3.60	15.77	12/9/93 Stack Test Results
SO <sub>2</sub>	0.61	lb/MMscf	2.65E-03	1.16E-02	AP-42 Table 3.2-3
CO	0.60	lb/hr/compressor	1.20	5.26	12/9/93 Stack Test Results
PM	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
PM <sub>10</sub>	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
PM <sub>2.5</sub>	20.25	lb/MMscf	8.74E-02	0.38	AP-42 Table 3.2-3
VOC	30.88	lb/MMscf	0.13	0.58	AP-42 Table 3.2-3
H <sub>2</sub> SO <sub>4</sub>	0	lb/MMscf	0	0	Negligible
CO <sub>2</sub> [3]	122,000.00	lb/MMscf	526.43	2,305.76	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	6.90	lb/MMscf	2.98E-02	0.13	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.38	lb/MMscf	5.95E-03	2.61E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	122,572.72	lb/MMscf	528.90	2,316.59	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-20

### Projected Actual Emission Calculations for Ultraformer Compressors (K1s)

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	14.55	0.01	4.86	0.31	0.31	0.31	0.49	0.00	1,957	Attachment B-11
B. Capable of Accommodating	15.45	0.01	5.15	0.37	0.37	0.37	0.57	0.00	2,270	See below.
C. Projected Emissions	15.77	0.01	5.26	0.38	0.38	0.38	0.58	0.00	2,317	
D. Demand Growth (D=B-A)	0.90	0.00	0.30	0.06	0.06	0.06	0.08	0.00	313	
E. Projected Actual Emissions (E=C-D)	14.87	0.01	4.96	0.32	0.32	0.32	0.50	0.00	2,004	
F. Emission Increase (F=E-A)	0.32	0.00	0.11	0.01	0.01	0.01	0.01	0.00	46	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	1,488	3.21	1,488	3.18	3.18	3.18	3.21	3.21	3.21	
Month that this occurred:	May-08	Dec-10	May-08	Jan-10	Jan-10	Jan-10	Dec-10	Dec-10	Dec-10	
Throughput that Unit was Capable of Accommodating (Units/year)	17,170	37.04	17,170	36.65	36.65	36.65	37.04	37.04	37.04	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	1.80	0.61	0.60	20.25	20.25	20.25	30.88	0.00	122,573	
Units	Hours	MMscf	Hours	MMscf	MMscf	MMscf	MMscf	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	15.45	0.01	5.15	0.37	0.37	0.37	0.57	0.00	2,270	

# Attachment B-21

## Baseline Actual Emission Calculations for Cooling Tower UU3

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Operating	TDS	Meas. VOC
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	Hours	mg/L	ppmv
	[1]	[1]	[1]	[2]	[3]	[3]	[4]	[1]	[1]	[1]	[1]	[1]	[5]	[5]	[5]
Jan-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Feb-08	0.00	0.00	0.00	1.11	0.51	0.00	5.84	0.00	0.00	0.00	0.00	0	696	3,688	79.70
Mar-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Apr-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
May-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Jun-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Jul-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Aug-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Sep-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Oct-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Nov-08	0.00	0.00	0.00	1.15	0.53	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,688	79.70
Dec-08	0.00	0.00	0.00	1.19	0.54	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,688	79.70
Jan-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Feb-09	0.00	0.00	0.00	1.04	0.48	0.00	5.64	0.00	0.00	0.00	0.00	0	672	3,568	79.70
Mar-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Apr-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
May-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Jun-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
Jul-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Aug-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Sep-09	0.00	0.00	0.00	1.11	0.51	0.00	6.04	0.00	0.00	0.00	0.00	0	720	3,568	79.70
Oct-09	0.00	0.00	0.00	1.15	0.53	0.00	6.25	0.00	0.00	0.00	0.00	0	744	3,568	79.70
Nov-09	0.00	0.00	0.00	1.11	0.51	0.00	3.42	0.00	0.00	0.00	0.00	0	720	3,568	45.09
Dec-09	0.00	0.00	0.00	1.15	0.53	0.00	3.59	0.00	0.00	0.00	0.00	0	744	3,568	45.81
Jan-10	0.00	0.00	0.00	1.17	0.54	0.00	7.86	0.00	0.00	0.00	0.00	0	744	3,644	100.27
Feb-10	0.00	0.00	0.00	1.06	0.49	0.00	15.06	0.00	0.00	0.00	0.00	0	672	3,644	212.74
Mar-10	0.00	0.00	0.00	1.17	0.54	0.00	4.31	0.00	0.00	0.00	0.00	0	744	3,644	54.96
Apr-10	0.00	0.00	0.00	1.14	0.52	0.00	25.05	0.00	0.00	0.00	0.00	0	720	3,644	330.28
May-10	0.00	0.00	0.00	1.17	0.54	0.00	1.74	0.00	0.00	0.00	0.00	0	744	3,644	22.23
Jun-10	0.00	0.00	0.00	1.14	0.52	0.00	2.59	0.00	0.00	0.00	0.00	0	720	3,644	34.18
Jul-10	0.00	0.00	0.00	1.17	0.54	0.00	14.53	0.00	0.00	0.00	0.00	0	744	3,644	185.44
Aug-10	0.00	0.00	0.00	1.17	0.54	0.00	1.31	0.00	0.00	0.00	0.00	0	744	3,644	16.69
Sep-10	0.00	0.00	0.00	1.14	0.52	0.00	4.47	0.00	0.00	0.00	0.00	0	720	3,644	58.90
Oct-10	0.00	0.00	0.00	1.17	0.54	0.00	2.38	0.00	0.00	0.00	0.00	0	744	3,644	30.38
Nov-10	0.00	0.00	0.00	1.14	0.52	0.00	4.88	0.00	0.00	0.00	0.00	0	720	3,644	64.33
Dec-10	0.00	0.00	0.00	1.17	0.54	0.00	2.57	0.00	0.00	0.00	0.00	0	744	3,644	32.75
Jan-11	0.00	0.00	0.00	1.07	0.49	0.00	7.60	0.00	0.00	0.00	0.00	0	744	3,313	96.93
Feb-11	0.00	0.00	0.00	0.96	0.44	0.00	10.64	0.00	0.00	0.00	0.00	0	672	3,313	150.35
Mar-11	0.00	0.00	0.00	1.07	0.49	0.00	8.45	0.00	0.00	0.00	0.00	0	744	3,313	107.87
Apr-11	0.00	0.00	0.00	1.03	0.47	0.00	0.27	0.00	0.00	0.00	0.00	0	720	3,313	3.54
May-11	0.00	0.00	0.00	1.07	0.49	0.00	0.01	0.00	0.00	0.00	0.00	0	744	3,313	0.19
Jun-11	0.00	0.00	0.00	1.03	0.47	0.00	0.09	0.00	0.00	0.00	0.00	0	720	3,313	1.22

## Attachment B-21

### Baseline Actual Emission Calculations for Cooling Tower UU3

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Operating	TDS	Meas. VOC
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	Hours	mg/L	ppmv
Date	[1]	[1]	[1]	[2]	[3]	[3]	[4]	[1]	[1]	[1]	[1]	[1]	[5]	[5]	[5]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--
Baseline Actual Emissions:	0.00	0.00	0.00	13.72	6.29	0.03	77.49	0.00	0	0.00	0.00	0	--	--	--
Monthly Maximum Throughput During Baseline:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	744.00	3,688	330.28
Occurs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Jan-08	Jan-08	Apr-10

#### Emission Factor References

- [1] No emissions of NO<sub>x</sub>, SO<sub>2</sub>, CO, H<sub>2</sub>SO<sub>4</sub>, CO<sub>2</sub>, CH<sub>4</sub>, or N<sub>2</sub>O from the cooling tower.
- [2] Calculated as follows: (34,588 gal/min circulation rate) \* 0.02% drift \* 8.34 lb/gal \* TDS (ppm) / 10<sup>6</sup> \* 60 min/hr \* hr/mo / 2000 lb/ton
- [3] Fraction of total PM that is PM<sub>10</sub> is 45.89%, and PM<sub>2.5</sub> is 0.20% based on Reisman and Frisbie, Calculating Realistic PM<sub>10</sub> Emissions from Cooling Towers, Proceedings of 2001 A&WMA ACE.
- [4] Calculated as follows: (34,588 gal/min circulation rate) \* 8.34 lb/gal \* C (ppmw) / 10<sup>6</sup> \* 60 min/hr \* hr/mo / 2000 lb/ton
- $$C = \frac{M \times (P \times 0.03342 \frac{\text{atm}}{\text{mmHg}}) \times b \times c}{R \times (T + 273) \times a}$$
- C = Concentration of air strippable compound in the water matrix, part-per-million by weight (ppmw).  
M = Molecular weight of the compound, 16.05 g/mol for methane.  
P = Pressure in the stripping chamber, 29.92 in Hg (assumed to be the same as atmospheric pressure).  
b = Stripping air flow rate, 2500 ml/min.  
c = Concentration of compound in the stripped air, ppmv as CH<sub>4</sub>, from the FID analyzer.  
R = Ideal gas constant, 82.054 ml-atm/mol-K  
T = Stripping chamber temperature, 48 C.  
a = Sample water flow rate, 125 ml/min.
- [5] Measured throughput rates. No downtime for cooling tower. TDS value based on measured conductivity (assuming TDS = conductivity) average for each calendar year. Measured VOC data is concentration in the stripped air as measured by an FID analyzer (Method 21).

## Attachment B-22

### Projected Actual Emission Calculations for Cooling Tower UU3

Quantity	Value	Units	Reference
Projected TDS:	3688	mg/L	Engineering estimate
Projected VOC:	6.20	ppmv, air	Leak threshold under 40 CFR 63 Subpart CC, 245 days/year
	62	ppmv, air	Delay of repair threshold under 40 CFR 63 Subpart CC, 120 days/year
	24.55	ppmv, air	Annual average
Circulation Rate:	42229	gpm	Design rate
Drift:	0.005%		
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0	--	0	0	--
SO <sub>2</sub>	0	--	0	0	--
CO	0	--	0	0	--
PM	1.54	lb/MMgal	3.90	17.07	AP-42 Section 13.4
PM <sub>10</sub> [3]	0.71	lb/MMgal	1.79	7.83	AP-42 Section 13.4
PM <sub>2.5</sub> [3]	3.08E-03	lb/MMgal	7.79E-03	3.41E-02	AP-42 Section 13.4
VOC [4]	2.49	lb/MMgal	6.31	27.65	EPA Method 21 (El Paso Method)
H <sub>2</sub> SO <sub>4</sub>	0	--	0	0	--
CO <sub>2</sub>	0	--	0	0	--
CH <sub>4</sub>	0	--	0	0	--
N <sub>2</sub> O	0	--	0	0	--
CO <sub>2</sub> e	0	--	0	0	--

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Fraction of total PM that is PM10 is 45.89%, and PM2.5 is 0.20% based on Reisman and Frisbie, Calculating Realistic PM10 Emissions from Cooling Towers, Proceedings of 2001 A&WMA ACE.

[4] Refer to reference [4] shown on Baseline Actual Emission calculations.

## Attachment B-22

### Projected Actual Emission Calculations for Cooling Tower UU3

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	Reference
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	
A. Baseline Actual Emissions	0.00	0.00	0.00	13.72	6.29	0.03	77.49	0.00	0	Attachment B-21
B. Capable of Accommodating	0.00	0.00	0.00	13.98	6.41	0.03	22.65	0.00	0	See below.
C. Projected Emissions	0.00	0.00	0.00	17.07	7.83	0.03	27.65	0.00	0	
D. Demand Growth (D=B-A)	0.00	0.00	0.00	0.26	0.12	0.00	0.00	0.00	0	
E. Projected Actual Emissions (E=C-D)	0.00	0.00	0.00	16.81	7.71	0.03	27.65	0.00	0	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	N/A	N/A	N/A	--	--	--	--	N/A	N/A	
Month that this occurred:	N/A	N/A	N/A	--	--	--	--	N/A	N/A	
Throughput that Unit was Capable of Accommodating (Units/year)	N/A	N/A	N/A	18,179	18,179	18,179	18,179	N/A	N/A	34,588 gpm x 8,760 hr/yr
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	N/A	N/A	N/A	1.54	0.71	0.00	2.49	N/A	N/A	
Units	N/A	N/A	N/A	MMgal	MMgal	MMgal	MMgal	N/A	N/A	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	0	0	0	13.98	6.41	0.03	22.65	0	0	

## Attachment B-23

## Baseline Actual Emission Calculations for Cogeneration Unit Turbines

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Turbine Natural Gas		Turbine Fuel Gas		Total	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MMBtu	MMscf	MMBtu	MMscf	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[10]	[10]
Jan-08	6.85	0.04	8.13	0.65	0.65	0.65	0.21	0.00	11,759	0.65	0.13	11,813	152,419	144.66	45,917	40.94	198,336	185.60
Feb-08	6.22	0.05	7.12	0.57	0.57	0.57	0.18	0.00	10,259	0.57	0.11	10,306	125,411	119.03	48,168	49.50	173,579	168.53
Mar-08	6.55	0.06	7.20	0.58	0.58	0.58	0.18	0.00	10,079	0.58	0.12	10,127	128,075	121.56	47,472	55.94	175,547	177.49
Apr-08	5.91	0.05	6.84	0.55	0.55	0.55	0.18	0.00	9,780	0.55	0.11	9,826	118,977	112.92	47,847	47.11	166,824	160.03
May-08	5.60	0.05	6.45	0.52	0.52	0.52	0.17	0.00	9,316	0.52	0.10	9,360	107,758	102.27	49,681	49.31	157,439	151.58
Jun-08	5.63	0.05	6.50	0.52	0.52	0.52	0.17	0.00	9,365	0.52	0.10	9,409	113,152	107.39	45,404	45.06	158,556	152.46
Jul-08	6.30	0.05	7.10	0.57	0.57	0.57	0.18	0.00	10,190	0.57	0.11	10,237	127,375	120.89	45,880	49.70	173,255	170.59
Aug-08	6.44	0.06	7.44	0.60	0.60	0.60	0.19	0.00	10,713	0.60	0.12	10,763	129,278	122.70	52,083	51.69	181,361	174.39
Sep-08	6.82	0.05	7.58	0.61	0.61	0.61	0.19	0.00	10,779	0.61	0.12	10,830	142,030	134.80	42,743	49.83	184,772	184.63
Oct-08	6.61	0.05	7.56	0.61	0.61	0.61	0.19	0.00	10,884	0.61	0.12	10,935	138,488	131.44	45,985	47.68	184,474	179.12
Nov-08	7.23	0.05	8.37	0.67	0.67	0.67	0.21	0.00	12,021	0.67	0.13	12,077	155,695	147.77	48,454	48.09	204,148	195.86
Dec-08	7.07	0.05	8.50	0.68	0.68	0.68	0.22	0.00	12,411	0.68	0.14	12,468	153,242	145.44	54,065	45.94	207,307	191.39
Jan-09	6.63	0.02	7.68	0.62	0.62	0.62	0.20	0.00	10,897	0.62	0.12	10,949	171,463	164.70	15,908	14.81	187,371	179.51
Feb-09	6.31	0.00	7.29	0.59	0.59	0.59	0.19	0.00	10,253	0.59	0.12	10,302	177,789	170.78	0	0.00	177,789	170.78
Mar-09	6.47	0.00	7.48	0.60	0.60	0.60	0.19	0.00	10,519	0.60	0.12	10,569	182,403	175.21	0	0.00	182,403	175.21
Apr-09	6.02	0.02	6.95	0.56	0.56	0.56	0.18	0.00	9,838	0.56	0.11	9,884	152,582	146.57	16,837	16.39	169,419	162.95
May-09	6.36	0.05	7.34	0.59	0.59	0.59	0.19	0.00	10,527	0.59	0.12	10,576	134,910	129.59	44,012	42.69	178,922	172.28
Jun-09	6.19	0.04	7.23	0.58	0.58	0.58	0.19	0.00	10,367	0.58	0.12	10,415	130,910	125.75	45,409	41.77	176,319	167.52
Jul-09	6.53	0.05	7.53	0.61	0.61	0.61	0.19	0.00	10,810	0.61	0.12	10,861	136,345	130.97	47,232	45.82	183,577	176.79
Aug-09	6.82	0.05	7.86	0.63	0.63	0.63	0.20	0.00	11,265	0.63	0.13	11,317	148,081	142.24	43,665	42.36	191,746	184.60
Sep-09	6.61	0.04	7.62	0.61	0.61	0.61	0.20	0.00	10,923	0.61	0.12	10,974	143,806	138.14	42,142	40.88	185,948	179.02
Oct-09	6.31	0.04	7.28	0.59	0.59	0.59	0.19	0.00	10,429	0.59	0.12	10,478	137,162	131.75	40,365	39.15	177,527	170.91
Nov-09	7.25	0.05	8.36	0.67	0.67	0.67	0.21	0.00	11,981	0.67	0.13	12,037	155,848	149.70	47,970	46.53	203,818	196.24
Dec-09	7.51	0.02	8.58	0.69	0.69	0.69	0.22	0.00	12,134	0.69	0.14	12,191	189,557	182.08	19,756	21.22	209,313	203.30
Jan-10	5.89	0.02	6.77	0.55	0.55	0.55	0.17	0.00	9,570	0.55	0.11	9,615	150,324	144.54	14,917	15.01	165,241	159.55
Feb-10	5.01	0.02	5.75	0.46	0.46	0.46	0.15	0.00	8,116	0.46	0.09	8,154	126,470	121.60	13,790	14.17	140,260	135.78
Mar-10	5.97	0.03	6.78	0.55	0.55	0.55	0.17	0.00	9,595	0.55	0.11	9,640	134,275	129.11	31,170	32.51	165,445	161.62
Apr-10	6.84	0.05	8.20	0.66	0.66	0.66	0.21	0.00	11,877	0.66	0.13	11,932	146,978	141.32	53,111	43.82	200,089	185.15
May-10	6.06	0.05	7.03	0.57	0.57	0.57	0.18	0.00	10,087	0.57	0.11	10,134	121,533	116.86	49,883	47.32	171,416	164.18
Jun-10	6.15	0.05	7.22	0.58	0.58	0.58	0.18	0.00	10,391	0.58	0.12	10,439	123,455	118.71	52,578	47.81	176,034	166.51
Jul-10	6.82	0.06	8.11	0.65	0.65	0.65	0.21	0.00	11,747	0.65	0.13	11,801	137,397	132.11	60,397	52.67	197,794	184.78
Aug-10	6.71	0.06	8.04	0.65	0.65	0.65	0.21	0.00	11,691	0.65	0.13	11,745	130,891	125.86	65,181	55.78	196,073	181.64
Sep-10	6.80	0.06	7.93	0.64	0.64	0.64	0.20	0.00	11,423	0.64	0.13	11,475	135,745	130.52	57,675	53.67	193,420	184.20
Oct-10	6.38	0.05	7.53	0.61	0.61	0.61	0.19	0.00	10,887	0.61	0.12	10,937	129,553	124.57	54,052	48.14	183,605	172.71
Nov-10	6.40	0.04	7.66	0.62	0.62	0.62	0.20	0.00	11,087	0.62	0.12	11,138	144,686	139.12	42,080	34.17	186,766	173.29
Dec-10	7.10	0.03	8.33	0.67	0.67	0.67	0.21	0.00	11,927	0.67	0.13	11,983	168,966	162.47	34,266	29.75	203,231	192.21
Jan-11	7.12	0.03	8.25	0.66	0.66	0.66	0.21	0.00	11,757	0.66	0.13	11,812	170,227	163.91	30,882	28.88	201,109	192.79
Feb-11	5.93	0.03	6.93	0.56	0.56	0.56	0.18	0.00	9,938	0.56	0.11	9,984	138,415	133.28	30,709	27.20	169,123	160.48
Mar-11	6.53	0.03	7.57	0.61	0.61	0.61	0.19	0.00	10,789	0.61	0.12	10,839	156,018	150.23	28,610	26.64	184,628	176.88
Apr-11	5.65	0.04	6.47	0.52	0.52	0.52	0.17	0.00	9,275	0.52	0.10	9,318	118,612	114.21	39,243	38.81	157,855	153.03
May-11	6.30	0.06	7.27	0.58	0.58	0.58	0.19	0.00	10,491	0.58	0.12	10,539	115,215	110.89	62,019	59.79	177,234	170.68
Jun-11	5.00	0.04	5.85	0.47	0.47	0.47	0.15	0.00	8,459	0.47	0.09	8,498	96,903	93.27	45,875	42.12	142,778	135.38



## Attachment B-23

### Baseline Actual Emission Calculations for Cogeneration Unit Turbines

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	Turbine Natural Gas		Turbine Fuel Gas		Total	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MMBtu	MMscf	MMBtu	MMscf	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]	[10]	[10]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--	--	--		
Baseline Actual Emissions:	77.54	0.50	90.38	7.19	7.19	7.19	2.31	0.01	129,278	7.26	1.45	129,880	--	--	--	--		
Monthly Maximum Throughput During Baseline:	203.30	203.30	209,313	209,313	209,313	209,313	209,313	203.30	203.30	203.30	203.30	203.30	189,557	182.08	65,181	55.94	209,313	203.30
Occurs:	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Aug-10	Mar-08	Dec-09	Dec-09

#### Emission Factor References

- [1] Average of 10/20/08, 10/27/08, 10/22/10, 10/26/10 stack test results (73.85 lb/MMscf).
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 0.082 lb/MMBtu per AP-42 Table 3.1-1.
- [4] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
- [5] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
- [6] Emission factor of 0.0066 lb/MMBtu per AP-42 Table 3.1-2a.
- [7] Emission factor of 0.0021 lb/MMBtu per AP-42 Table 3.1-2a.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Based on carbon content and molecular weight (calculations on following page).
- [10] Based on provided throughput rates.

## Attachment B-24

### Projected Actual Emission Calculations for Cogeneration Unit Turbines

Quantity	Value	Units	Reference
Projected Nat Gas Firing:	201.01	MMBtu/hr	Engineering estimate
Nat Gas HHV:	1043.3	Btu/scf	2008-2011 monitoring
Projected Fuel Gas Firing:	67.63	MMBtu/hr	Engineering estimate
Fuel Gas HHV:	1048.5	Btu/scf	Engineering estimate
Fuel Gas H <sub>2</sub> S Content:	12.86	ppmvd	2011 monitoring
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	73.85	lb/MMscf	18.99	83.18	2008-2010 Stack Test Results
SO <sub>2</sub>	0.54	lb/MMscf	0.14	0.61	Calculated
CO	8.20E-02	lb/MMBtu	22.03	96.48	AP-42 Table 3.1-1
PM	6.60E-03	lb/MMBtu	1.77	7.77	AP-42 Table 3.1-2a
PM <sub>10</sub>	6.60E-03	lb/MMBtu	1.77	7.77	AP-42 Table 3.1-2a
PM <sub>2.5</sub>	6.60E-03	lb/MMBtu	1.77	7.77	AP-42 Table 3.1-2a
VOC	0.0021	lb/MMBtu	0.56	2.47	AP-42 Table 3.1-2a
H <sub>2</sub> SO <sub>4</sub>	0.01	lb/MMscf	2.07E-03	9.09E-03	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	129,049.23	lb/MMscf	33,187.02	145,359.16	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	6.91	lb/MMscf	1.78	7.78	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.38	lb/MMscf	0.36	1.56	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	129,622.67	lb/MMscf	33,334.49	146,005.08	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-24

### Projected Actual Emission Calculations for Cogeneration Unit Turbines

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	77.54	0.50	90.38	7.19	7.19	7.19	2.31	0.01	129,880	Attachment B-23
B. Capable of Accommodating	86.62	0.63	99.02	7.97	7.97	7.97	2.54	9.46E-03	152,037	See below.
C. Projected Emissions	83.18	0.61	96.48	7.77	7.77	7.77	2.47	0.01	146,005	
D. Demand Growth (D=B-A)	9.08	0.13	8.65	0.78	0.78	0.78	0.22	0.00	22,157	
E. Projected Actual Emissions (E=C-D)	74.10	0.47	87.84	6.99	6.99	6.99	2.25	0.01	123,848	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
<b>B. Capable of Accommodating</b>										
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	203	203	209,313	209,313	209,313	209,313	209,313	203	203	
Month that this occurred:	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	Dec-09	
Throughput that Unit was Capable of Accommodating (Units/year)	2,346	2,346	2,415,205	2,415,205	2,415,205	2,415,205	2,415,205	2,346	2,346	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	73.850	0.54	0.082	6.60E-03	6.60E-03	6.60E-03	2.10E-03	0.01	129,623	
Units	MMscf	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	86.62	0.63	99.02	7.97	7.97	7.97	2.54	0.01	152,037	

# Attachment B-25

## Baseline Actual Emission Calculations for Cogeneration Unit HRSGs

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	HRSG Fuel Gas	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MMBtu	MMscf
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]
Jan-08	3.44	0.19	2.59	0.23	0.23	0.23	0.17	0.00	2,819	0.21	0.04	2,836	62,907	93.07
Feb-08	3.05	0.16	2.53	0.23	0.23	0.23	0.17	0.00	3,001	0.20	0.04	3,018	61,516	82.57
Mar-08	3.45	0.21	2.45	0.22	0.22	0.22	0.16	0.00	2,654	0.20	0.04	2,671	59,617	93.40
Apr-08	3.40	0.28	2.50	0.23	0.23	0.23	0.16	0.00	2,649	0.20	0.04	2,665	60,642	92.10
May-08	4.76	0.39	3.54	0.32	0.32	0.32	0.23	0.01	3,818	0.28	0.06	3,841	86,071	129.00
Jun-08	5.86	0.93	5.23	0.47	0.47	0.47	0.34	0.01	6,504	0.42	0.08	6,539	127,081	158.63
Jul-08	5.54	0.92	4.56	0.41	0.41	0.41	0.30	0.01	5,395	0.37	0.07	5,425	110,856	150.16
Aug-08	4.93	0.47	3.68	0.33	0.33	0.33	0.24	0.01	4,062	0.30	0.06	4,086	89,466	133.44
Sep-08	3.21	0.25	2.40	0.22	0.22	0.22	0.16	0.00	2,635	0.19	0.04	2,651	58,194	86.89
Oct-08	3.55	0.23	2.87	0.26	0.26	0.26	0.19	0.00	3,365	0.23	0.05	3,384	69,590	96.11
Nov-08	3.38	0.17	2.89	0.26	0.26	0.26	0.19	0.00	3,498	0.23	0.05	3,517	70,132	91.43
Dec-08	3.61	0.18	3.26	0.30	0.30	0.30	0.21	0.00	4,061	0.26	0.05	4,083	79,258	97.84
Jan-09	4.31	0.30	4.10	0.37	0.37	0.37	0.27	0.00	5,314	0.33	0.07	5,342	99,541	116.62
Feb-09	4.08	0.17	3.57	0.32	0.32	0.32	0.23	0.00	4,428	0.29	0.06	4,451	86,667	110.50
Mar-09	4.67	0.32	3.48	0.31	0.31	0.31	0.23	0.00	4,442	0.28	0.06	4,465	84,466	126.57
Apr-09	4.25	0.36	3.53	0.32	0.32	0.32	0.23	0.01	4,222	0.28	0.06	4,245	85,789	115.05
May-09	4.93	0.41	4.14	0.37	0.37	0.37	0.27	0.01	4,972	0.33	0.07	4,999	100,582	133.62
Jun-09	5.13	0.48	4.21	0.38	0.38	0.38	0.28	0.01	4,850	0.34	0.07	4,878	102,125	138.85
Jul-09	4.98	0.59	3.90	0.35	0.35	0.35	0.26	0.01	4,815	0.33	0.07	4,842	94,780	134.99
Aug-09	5.15	0.60	4.43	0.40	0.40	0.40	0.29	0.01	5,318	0.35	0.07	5,347	107,466	139.53
Sep-09	4.81	0.50	4.15	0.38	0.38	0.38	0.27	0.01	5,011	0.33	0.07	5,039	100,768	130.25
Oct-09	4.01	0.39	3.45	0.31	0.31	0.31	0.23	0.01	4,240	0.28	0.06	4,263	83,726	108.66
Nov-09	2.29	0.20	1.91	0.17	0.17	0.17	0.13	0.00	2,281	0.15	0.03	2,294	46,482	61.97
Dec-09	3.42	0.22	3.34	0.30	0.30	0.30	0.22	0.00	4,501	0.27	0.05	4,523	80,995	92.57
Jan-10	4.23	0.34	4.03	0.36	0.36	0.36	0.26	0.01	4,670	0.30	0.06	4,695	97,795	114.58
Feb-10	3.22	0.37	2.67	0.24	0.24	0.24	0.17	0.01	3,123	0.21	0.04	3,140	64,817	87.19
Mar-10	3.26	0.10	3.50	0.32	0.32	0.32	0.23	0.00	4,965	0.28	0.06	4,988	85,080	88.24
Apr-10	3.23	0.21	3.59	0.33	0.33	0.33	0.24	0.00	4,964	0.29	0.06	4,988	87,291	87.41
May-10	4.00	0.37	3.41	0.31	0.31	0.31	0.22	0.01	4,049	0.27	0.05	4,072	82,816	108.35
Jun-10	3.70	0.37	3.18	0.29	0.29	0.29	0.21	0.01	3,780	0.25	0.05	3,801	77,113	100.24
Jul-10	3.98	0.49	3.26	0.30	0.30	0.30	0.21	0.01	3,761	0.26	0.05	3,782	79,267	107.84
Aug-10	3.48	0.41	2.95	0.27	0.27	0.27	0.19	0.01	3,485	0.24	0.05	3,505	71,555	94.33
Sep-10	3.48	0.28	2.95	0.27	0.27	0.27	0.19	0.00	3,496	0.24	0.05	3,515	71,669	94.15
Oct-10	4.04	0.33	3.76	0.34	0.34	0.34	0.25	0.00	4,759	0.30	0.06	4,784	91,292	109.42
Nov-10	3.68	0.22	3.75	0.34	0.34	0.34	0.25	0.00	5,113	0.30	0.06	5,138	91,186	99.68
Dec-10	3.46	0.24	2.93	0.27	0.27	0.27	0.19	0.00	3,464	0.24	0.05	3,484	71,274	93.82
Jan-11	3.97	0.38	3.72	0.34	0.34	0.34	0.24	0.01	4,743	0.30	0.06	4,768	90,442	107.56
Feb-11	3.29	0.28	2.82	0.25	0.25	0.25	0.18	0.00	3,392	0.23	0.05	3,411	68,395	89.04
Mar-11	3.41	0.31	3.03	0.27	0.27	0.27	0.20	0.00	3,756	0.24	0.05	3,776	73,500	92.25
Apr-11	4.24	0.38	3.76	0.34	0.34	0.34	0.25	0.01	4,636	0.30	0.06	4,661	91,368	114.89
May-11	3.93	0.32	3.33	0.30	0.30	0.30	0.22	0.00	3,968	0.27	0.05	3,990	80,944	106.46
Jun-11	4.64	0.37	4.21	0.38	0.38	0.38	0.28	0.01	5,217	0.34	0.07	5,245	102,176	125.64

## Attachment B-25

### Baseline Actual Emission Calculations for Cogeneration Unit HRSGs

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	HRSG Fuel Gas	
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e	MMBtu	MMscf
Date	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[9]	[9]	[9]	[10]	[10]
Baseline Period Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	--	--
Baseline Actual Emissions:	47.97	4.19	41.53	3.90	3.90	3.90	2.76	0.06	50,570	3.29	0.66	50,843	--	--
Monthly Maximum Throughput During Baseline:	139.53	134.99	107,466	107,466	107,466	107,466	100,768	134.99	139.53	139.53	139.53	139.53	107,466	139.53
Occurs:	Aug-09	Jul-09	Aug-09	Aug-09	Aug-09	Aug-09	Sep-09	Jul-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09	Aug-09

#### Emission Factor References

- [1] Average of 10/20/08, 10/27/08, 10/22/10, 10/26/10 stack test results (73.85 lb/MMscf).
- [2] Calculated as follows: SO<sub>2</sub> (tons) = Monthly average fuel gas H<sub>2</sub>S contents (ppmv) \* 10<sup>6</sup> / 385.34 ft<sup>3</sup>/lb-mol \* 64 lb/lb-mol \* MMscf / 2000 lb/ton.
- [3] Emission factor of 84 lb/MMscf per AP-42 Table 1.4-2.
- [4] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
- [5] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
- [6] Emission factor of 7.6 lb/MMscf per AP-42 Table 1.4-2.
- [7] Emission factor of 5.5 lb/MMscf per AP-42 Table 1.4-2 for HRSG fuel gas; Emission factor of 0.0021 lb/MMBtu per AP-42 Table 3.1-2a for Turbine.
- [8] Assumed to be 1.5% of total SO<sub>2</sub> emissions consistent with TRI reporting.
- [9] Calculated as follows: CO<sub>2</sub> (tons) = 44/12 \* CC \* MW / (849.5 scf/kg-mol) \* 2.2 lb/kg \* 10<sup>6</sup> scf/MMscf \* MMscf / 2000 lb/ton per Equation C-5 of 40 CFR 98.  
 CH<sub>4</sub> (tons) = 0.003 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 N<sub>2</sub>O (tons) = 0.0006 \* HHV \* 2.2 lb/kg \* MMscf / 2000 lb/ton per Equation C-8 of 40 CFR 98.  
 CO<sub>2</sub>e (tons) = CO<sub>2</sub> (tons) + 21 \* CH<sub>4</sub> (tons) + 310 \* N<sub>2</sub>O (tons) per Table A-1 of 40 CFR 98.
- [10] Based on provided throughput rates. Rates for June 2008 and July 2008 are not considered in the monthly maximum throughput rates due to atypical firing rates.

## Attachment B-26

### Projected Actual Emission Calculations for Cogeneration Unit HRSGs

Quantity	Value	Units	Reference
Projected Firing Rate:	128.71	Mscf/hr	Calculated
	139.50	MMBtu/hr	Engineering estimate
Fuel HHV:	1083.8	Btu/scf	Engineering estimate
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Hours of Operation:	8760	hr/yr	

#### HRSG Fuel Gas

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	73.85	lb/MMscf	9.51	41.63	2008-2010 Stack Test Results
SO <sub>2</sub>	8.31	lb/MMscf	1.07	4.68	Calculated
CO	8.24E-02	lb/MMBtu	11.49	50.32	AP-42 Table 1.4-2
PM	7.45E-03	lb/MMBtu	1.04	4.55	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	1.04	4.55	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	1.04	4.55	AP-42 Table 1.4-2
VOC	5.39E-03	lb/MMBtu	0.75	3.29	AP-42 Table 1.4-2
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	1.60E-02	7.02E-02	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	18,276.93	80,052.97	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	7.17	lb/MMscf	0.92	4.04	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	0.18	0.81	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	18,353.51	80,388.38	40 CFR 98 Subpart A

[1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf

[2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton

[3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98

[4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98

[6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-26

### Projected Actual Emission Calculations for Cogeneration Unit HRSGs

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	47.97	4.19	41.53	3.90	3.90	3.90	2.76	0.06	50,843	Attachment B-25
B. Capable of Accommodating	59.45	6.47	51.06	4.62	4.62	4.62	3.24	9.70E-02	91,871	See below.
C. Projected Emissions	41.63	4.68	50.32	4.55	4.55	4.55	3.29	0.07	80,388	
D. Demand Growth (D=B-A)	11.47	2.28	9.53	0.72	0.72	0.72	0.48	0.03	41,028	
E. Projected Actual Emissions (E=C-D)	30.16	2.40	40.79	3.84	3.84	3.84	2.81	0.04	39,360	
F. Emission Increase (F=E-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Annual Emission Limits (ton/yr)	CAP	CAP	N/A	N/A	CAP	N/A	N/A	N/A	N/A	
Representative Monthly Throughput during Baseline Period (Units/mo)	140	135	107,466	107,466	107,466	107,466	100,768	135	140	
Month that this occurred:	Aug-09	Jul-09	Aug-09	Aug-09	Aug-09	Aug-09	Sep-09	Jul-09	Aug-09	
Throughput that Unit was Capable of Accommodating (Units/year)	1,610	1,558	1,240,014	1,240,014	1,240,014	1,240,014	1,201,485	1,558	1,610	Assumes a 98% utilization factor.
Representative Emission Factor that Unit was Capable of Accommodating (lb/Units)	73.850	8.31	0.0824	7.45E-03	7.45E-03	7.45E-03	5.39E-03	0.12	114,128	CO2e: max 1-mo. during baseline
Units	MMscf	MMscf	MMBtu	MMBtu	MMBtu	MMBtu	MMBtu	MMscf	MMscf	
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	59.45	6.47	51.06	4.62	4.62	4.62	3.24	0.10	91,871	

The representative monthly throughput during the baseline period excludes Jun-08 and Jul-08 due to higher than typical firing rates.

## Attachment B-27

### Baseline and Projected Actual Emission Calculations for Gasoline and Diesel Loadout

2008

Liquid Loaded	Thruput mgal/yr	Saturation Factor	True VP psia	MW lb/lb-mole	Temp		Uncontrolled Release Factor	Uncontrolled Loss (lb)	Leakage Loss	Fug Loss lb/year	Controlled Release Factor	VRU Loss lb/year	Total Emissions	
					Deg F	Deg R							lb/year	ton/yr
Gasoline	252128	1	5.8000	66	66.4	526	9.068 lbs/mgal	2286262	0.008	18290.1	0.0467 lbs/mgal	11774.4	30064	15.03
Distillate	94580	1	0.0078	130	66.4	526	0.024 lbs/mgal	2272	1.000	2271.8			2272	1.14
<b>Total</b>													<b>32336</b>	<b>16.17</b>

2009

Liquid Loaded	Thruput mgal/yr	Saturation Factor	True VP psia	MW lb/lb-mole	Temp		Uncontrolled Release Factor	Uncontrolled Loss (lb)	Leakage Loss	Fug Loss lb/year	Controlled Release Factor	VRU Loss lb/year	Total Emissions	
					Deg F	Deg R							lb/year	ton/yr
Gasoline	267103	1	5.8000	66	66.4	526	9.068 lbs/mgal	2422049	0.008	19376.4	0.0467 lbs/mgal	12473.7	31850	15.93
Distillate	138760	1	0.0078	130	66.4	526	0.024 lbs/mgal	3333	1.000	3333.0			3333	1.67
<b>Total</b>													<b>35183</b>	<b>17.59</b>

2010

Liquid Loaded	Thruput mgal/yr	Saturation Factor	True VP psia	MW lb/lb-mole	Temp		Uncontrolled Release Factor	Uncontrolled Loss (lb)	Leakage Loss	Fug Loss lb/year	Controlled Release Factor	VRU Loss lb/year	Total Emissions	
					Deg F	Deg R							lb/year	ton/yr
Gasoline	249164	1	5.8000	66	66.4	526	9.068 lbs/mgal	2259380	0.008	18075.0	0.0467 lbs/mgal	11636.0	29711	14.86
Distillate	132495	1	0.0078	130	66.4	526	0.024 lbs/mgal	3183	1.000	3182.5			3183	1.59
<b>Total</b>													<b>32894</b>	<b>16.45</b>

#### Projection

Liquid Loaded	Thruput mgal/yr	Saturation Factor	True VP psia	MW lb/lb-mole	Temp		Uncontrolled Release Factor	Uncontrolled Loss (lb)	Leakage Loss	Fug Loss lb/year	Controlled Release Factor	VRU Loss lb/year	Total Emissions	
					Deg F	Deg R							lb/year	ton/yr
Gasoline	456129	1	6.82	65	66.4	526	10.494 lbs/mgal	4786657	0.008	38293.3	0.0467 lbs/mgal	21301.2	59594	29.80
Distillate	209147	1	0.0078	130	66.4	526	0.024 lbs/mgal	5024	1.000	5023.7			5024	2.51
<b>Total</b>													<b>64618</b>	<b>32.31</b>

#### Summary

Liquid Loaded	Baseline Actual Emissions	Capable of Accommodating	Projected Emissions	Demand Growth	Projected Actual Emissions	Emissions Increase
Gasoline	15.39	15.93	29.80	0.53	29.26	13.87
Distillate	1.63	1.67	2.51	0.04	2.47	0.85
<b>Total:</b>	<b>17.02</b>	<b>17.59</b>	<b>32.31</b>	<b>0.57</b>	<b>31.74</b>	<b>14.72</b>

#### Notes:

The VOC uncontrolled release factors are calculated following AP-42 Section 5.2, Equation 1. The collection efficiency of 99.2% is also based on AP-42 Section 5.2.

The controlled release factor from gasoline loading is based on the initial performance testing of VRU (1996).

Greenhouse gases are not included in the calculations consistent with 40 CFR 98.253(n) (less than 0.5% methane expected to be present).

Emissions that Tesoro was "Capable of Accommodating" are based on the maximum calendar year emissions during the baseline period of 2009-2010.



## Attachment B-28

## Baseline Actual Emission Calculations for LPG Loading Rack

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	GHG
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons mass	tons CO <sub>2</sub> e
Date	[1]	[1]	[1]	[1]	[1]	[1]	[2]	[1]	[1]	[1]	[1]	[1]	[1]
Jan-08	3.19E-05	1.99E-09	1.84E-05	1.72E-06	1.72E-06	1.72E-06	0.05	2.99E-11	0.11	5.17E-06	1.03E-06	0.11	0.11
Feb-08	2.56E-05	1.60E-09	1.47E-05	1.38E-06	1.38E-06	1.38E-06	0.05	2.40E-11	0.09	4.15E-06	8.30E-07	0.09	0.09
Mar-08	2.76E-05	1.72E-09	1.59E-05	1.48E-06	1.48E-06	1.48E-06	0.05	2.59E-11	0.10	4.48E-06	8.95E-07	0.10	0.10
Apr-08	2.02E-05	1.26E-09	1.16E-05	1.09E-06	1.09E-06	1.09E-06	0.05	1.89E-11	0.07	3.28E-06	6.56E-07	0.07	0.07
May-08	2.47E-05	1.54E-09	1.42E-05	1.33E-06	1.33E-06	1.33E-06	0.05	2.31E-11	0.09	4.00E-06	8.01E-07	0.09	0.09
Jun-08	3.23E-05	2.02E-09	1.87E-05	1.74E-06	1.74E-06	1.74E-06	0.06	3.03E-11	0.11	5.25E-06	1.05E-06	0.11	0.11
Jul-08	9.88E-04	6.15E-08	5.70E-04	5.32E-05	5.32E-05	5.32E-05	0.08	9.23E-10	3.48	1.60E-04	3.20E-05	3.48	3.49
Aug-08	5.95E-04	3.71E-08	3.44E-04	3.21E-05	3.21E-05	3.21E-05	0.07	5.56E-10	2.09	9.65E-05	1.93E-05	2.09	2.10
Sep-08	2.57E-05	1.61E-09	1.48E-05	1.38E-06	1.38E-06	1.38E-06	0.06	2.41E-11	0.09	4.17E-06	8.35E-07	0.09	0.09
Oct-08	1.04E-03	6.45E-08	5.98E-04	5.58E-05	5.58E-05	5.58E-05	0.08	9.68E-10	3.65	1.68E-04	3.36E-05	3.65	3.66
Nov-08	7.51E-04	4.67E-08	4.33E-04	4.04E-05	4.04E-05	4.04E-05	0.06	7.01E-10	2.64	1.22E-04	2.43E-05	2.64	2.65
Dec-08	1.08E-05	6.76E-10	6.24E-06	5.83E-07	5.83E-07	5.83E-07	0.03	1.01E-11	0.04	1.76E-06	3.51E-07	0.04	0.04
Jan-09	1.36E-05	8.48E-10	7.83E-06	7.30E-07	7.30E-07	7.30E-07	0.05	1.27E-11	0.05	2.20E-06	4.40E-07	0.05	0.05
Feb-09	2.01E-05	1.26E-09	1.16E-05	1.08E-06	1.08E-06	1.08E-06	0.06	1.88E-11	0.07	3.26E-06	6.53E-07	0.07	0.07
Mar-09	2.37E-05	1.48E-09	1.37E-05	1.28E-06	1.28E-06	1.28E-06	0.05	2.23E-11	0.08	3.85E-06	7.71E-07	0.08	0.08
Apr-09	5.20E-04	3.24E-08	3.00E-04	2.80E-05	2.80E-05	2.80E-05	0.07	4.85E-10	1.83	8.42E-05	1.68E-05	1.83	1.84
May-09	5.76E-04	3.58E-08	3.32E-04	3.10E-05	3.10E-05	3.10E-05	0.08	5.38E-10	2.02	9.32E-05	1.86E-05	2.02	2.03
Jun-09	8.35E-04	5.20E-08	4.82E-04	4.50E-05	4.50E-05	4.50E-05	0.08	7.80E-10	2.94	1.35E-04	2.71E-05	2.94	2.95
Jul-09	6.03E-04	3.76E-08	3.48E-04	3.25E-05	3.25E-05	3.25E-05	0.08	5.63E-10	2.12	9.78E-05	1.96E-05	2.12	2.13
Aug-09	1.22E-03	7.62E-08	7.06E-04	6.59E-05	6.59E-05	6.59E-05	0.09	1.14E-09	4.30	1.98E-04	3.96E-05	4.30	4.32
Sep-09	5.75E-04	3.58E-08	3.32E-04	3.10E-05	3.10E-05	3.10E-05	0.08	5.37E-10	2.02	9.32E-05	1.86E-05	2.02	2.03
Oct-09	3.24E-05	2.03E-09	1.87E-05	1.75E-06	1.75E-06	1.75E-06	0.07	3.04E-11	0.11	5.26E-06	1.05E-06	0.11	0.11
Nov-09	5.07E-05	3.17E-09	2.92E-05	2.73E-06	2.73E-06	2.73E-06	0.07	4.75E-11	0.18	8.22E-06	1.64E-06	0.18	0.18
Dec-09	7.97E-05	4.98E-09	4.60E-05	4.29E-06	4.29E-06	4.29E-06	0.07	7.48E-11	0.28	1.29E-05	2.59E-06	0.28	0.28
Jan-10	4.04E-04	2.53E-08	2.33E-04	2.18E-05	2.18E-05	2.18E-05	0.08	3.79E-10	1.42	6.57E-05	1.31E-05	1.42	1.43
Feb-10	5.12E-04	3.20E-08	2.95E-04	2.76E-05	2.76E-05	2.76E-05	0.08	4.80E-10	1.80	8.31E-05	1.66E-05	1.80	1.80
Mar-10	4.04E-04	2.52E-08	2.33E-04	2.17E-05	2.17E-05	2.17E-05	0.07	3.78E-10	1.42	6.55E-05	1.31E-05	1.42	1.42
Apr-10	1.28E-03	8.03E-08	7.41E-04	6.91E-05	6.91E-05	6.91E-05	0.08	1.20E-09	4.51	2.08E-04	4.17E-05	4.51	4.53
May-10	7.97E-04	4.97E-08	4.60E-04	4.29E-05	4.29E-05	4.29E-05	0.10	7.45E-10	2.80	1.29E-04	2.58E-05	2.80	2.81
Jun-10	2.39E-04	1.49E-08	1.38E-04	1.29E-05	1.29E-05	1.29E-05	0.07	2.23E-10	0.84	3.87E-05	7.74E-06	0.84	0.84
Jul-10	3.68E-05	2.30E-09	2.12E-05	1.98E-06	1.98E-06	1.98E-06	0.07	3.45E-11	0.13	5.97E-06	1.19E-06	0.13	0.13
Aug-10	3.33E-05	2.08E-09	1.92E-05	1.79E-06	1.79E-06	1.79E-06	0.07	3.12E-11	0.12	5.40E-06	1.08E-06	0.12	0.12
Sep-10	2.88E-05	1.80E-09	1.66E-05	1.55E-06	1.55E-06	1.55E-06	0.06	2.70E-11	0.10	4.67E-06	9.34E-07	0.10	0.10
Oct-10	8.50E-05	5.32E-09	4.91E-05	4.58E-06	4.58E-06	4.58E-06	0.08	7.98E-11	0.30	1.38E-05	2.76E-06	0.30	0.30
Nov-10	3.26E-04	2.04E-08	1.88E-04	1.76E-05	1.76E-05	1.76E-05	0.08	3.06E-10	1.15	5.30E-05	1.06E-05	1.15	1.15
Dec-10	2.12E-03	1.33E-07	1.22E-03	1.14E-04	1.14E-04	1.14E-04	0.15	1.99E-09	7.45	3.45E-04	6.89E-05	7.45	7.48
Jan-11	3.86E-04	2.42E-08	2.23E-04	2.08E-05	2.08E-05	2.08E-05	0.09	3.63E-10	1.36	6.28E-05	1.26E-05	1.36	1.36
Feb-11	4.16E-04	2.60E-08	2.40E-04	2.24E-05	2.24E-05	2.24E-05	0.10	3.90E-10	1.46	6.75E-05	1.35E-05	1.46	1.47
Mar-11	1.02E-04	6.39E-09	5.89E-05	5.50E-06	5.50E-06	5.50E-06	0.09	9.58E-11	0.36	1.66E-05	3.32E-06	0.36	0.36
Apr-11	2.09E-04	1.45E-08	1.20E-04	1.12E-05	1.12E-05	1.12E-05	0.08	2.18E-10	0.76	3.56E-05	7.11E-06	0.76	0.76
May-11	2.27E-04	1.42E-08	1.31E-04	1.22E-05	1.22E-05	1.22E-05	0.08	2.13E-10	0.80	3.69E-05	7.38E-06	0.80	0.80
Jun-11	2.89E-04	2.11E-08	1.67E-04	1.56E-05	1.56E-05	1.56E-05	0.08	3.16E-10	1.07	5.03E-05	1.01E-05	1.07	1.08

## Attachment B-28

### Baseline Actual Emission Calculations for LPG Loading Rack

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	GHG	GHG
	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons	tons mass	tons CO <sub>2</sub> e
Date	[1]	[1]	[1]	[1]	[1]	[1]	[2]	[1]	[1]	[1]	[1]	[1]	[1]
Baseline Period													
Ends:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11	May-11	May-11	May-11	May-11
Baseline Actual Emissions:	4.36E-03	3.44E-07	3.34E-03	3.07E-04	3.07E-04	3.07E-04	0.93	5.17E-09	19.37	8.94E-04	1.79E-04	19.37	19.44
Monthly Maximum Throughput During Baseline:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Occurs:	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

#### Emission Factor References

- [1] Based on flaring of captured gases from loading rack (refer to Barr Engineering Memorandum, December 2011).
- [2] Based on sum of uncaptured gases and flaring of captured gases at 98% control efficiency (refer to Barr Engineering Memorandum, December 2011).
- [3] Based on provided throughput rates. Rates for June 2008 and July 2008 are not considered in the monthly maximum throughput rates due to atypical firing rates.

## Attachment B-28

## Baseline Actual Emission Calculations for LPG Loading Rack

Date	Propane				Butylene				DB's (primarily Butylene)				n-Butane			
	Rail		Truck		Rail		Truck		Rail		Truck		Rail		Truck	
	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads
	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
Jan-08	0	0	0	0	0	0	0	0	0	60	0	0	0	0	0	0
Feb-08	0	0	0	0	0	0	0	0	0	33	0	0	0	0	0	0
Mar-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr-08	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
May-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jun-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jul-08	0	0	0	0	0	0	0	0	37	0	0	0	0	0	0	0
Aug-08	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0
Sep-08	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oct-08	0	0	0	0	0	0	0	0	39	0	0	0	0	0	0	0
Nov-08	0	0	0	0	0	0	0	0	28	18	0	0	0	0	0	0
Dec-08	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0
Jan-09	0	0	0	0	0	0	0	0	0	2	0	79	0	0	0	0
Feb-09	0	0	0	0	0	0	0	0	0	15	0	100	0	0	0	0
Mar-09	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0
Apr-09	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0
May-09	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0
Jun-09	0	0	0	0	1	0	0	0	30	0	0	0	0	0	0	0
Jul-09	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0
Aug-09	0	0	0	0	0	0	0	0	46	0	0	0	0	0	0	0
Sep-09	0	0	0	0	0	0	0	0	21	0	0	0	0	0	0	0
Oct-09	0	0	0	0	0	0	0	0	0	21	0	79	0	0	0	0
Nov-09	0	0	0	0	1	1	0	0	0	21	0	85	0	0	0	0
Dec-09	0	0	0	0	2	2	0	0	0	48	0	90	0	0	0	0
Jan-10	0	0	0	0	2	0	0	0	0	53	0	87	0	0	0	0
Feb-10	0	0	0	0	5	0	0	0	3	31	0	75	0	0	0	0
Mar-10	0	0	0	0	0	7	0	0	8	11	0	24	0	0	0	0
Apr-10	0	0	0	0	14	1	0	0	2	2	0	0	0	0	0	0
May-10	0	0	0	0	4	5	0	0	25	26	0	0	0	0	0	0
Jun-10	0	0	0	0	0	4	0	0	8	8	0	0	0	0	0	0
Jul-10	0	0	0	0	0	9	0	0	0	6	0	0	0	0	0	0
Aug-10	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Sep-10	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
Oct-10	0	0	0	0	2	0	0	0	0	31	0	90	0	0	0	0
Nov-10	5	0	0	0	6	2	0	0	0	35	0	91	0	0	0	0
Dec-10	33	24	0	0	33	19	57	0	0	63	0	87	0	0	0	0
Jan-11	13	19	0	0	0	1	0	0	0	53	0	95	0	0	0	0
Feb-11	12	13	0	0	2	3	0	0	0	51	0	79	0	6	0	0
Mar-11	0	5	0	0	2	5	0	0	0	0	0	0	0	53	0	0
Apr-11	2	12	0	0	3	3	0	0	0	0	0	0	0	20	0	0
May-11	3	4	0	0	4	3	0	0	0	0	0	26	0	29	0	0
Jun-11	0	0	0	0	4	10	0	0	3	0	0	24	0	15	0	0

Attachment B-28

Baseline Actual Emission Calculations for LPG Loading Rack

	Propane				Butylene				DB's (primarily Butylene)				n-Butane			
	Rail		Truck		Rail		Truck		Rail		Truck		Rail		Truck	
	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads
Date	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
Baseline Period Ends:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Actual Emissions: Monthly	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum Throughput During Baseline:	33	24	0	0	33	19	57	0	46	63	0	100	0	53	0	0
Occurs:	Dec-10	Dec-10	Jan-08	Jan-08	Dec-10	Dec-10	Dec-10	Jan-08	Aug-09	Dec-10	Jan-08	Feb-09	Jan-08	Mar-11	Jan-08	Jan-08

## Attachment B-28

## Baseline Actual Emission Calculations for LPG Loading Rack

Date	Mixed Butanes				Isobutanes				Alky Feed (primarily Butylene)				Propylene			
	Rail		Truck		Rail		Truck		Rail		Truck		Rail		Truck	
	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads
	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
Jan-08	0	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Feb-08	0	77	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mar-08	0	104	0	36	0	0	0	0	0	0	0	0	0	0	0	0
Apr-08	0	75	0	54	0	0	0	0	0	0	0	0	0	0	0	0
May-08	0	93	0	69	0	0	0	0	0	0	0	0	0	0	0	0
Jun-08	0	122	0	49	0	0	0	0	0	0	0	0	0	0	0	0
Jul-08	0	108	0	63	0	0	0	0	0	0	0	0	0	0	0	0
Aug-08	0	94	0	86	0	0	0	0	0	0	0	0	0	0	0	0
Sep-08	0	97	0	87	0	0	0	0	0	0	0	0	0	0	0	0
Oct-08	0	94	0	37	0	0	0	0	0	0	0	0	0	0	0	0
Nov-08	0	83	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dec-08	0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan-09	0	50	0	56	0	0	0	0	0	0	0	0	0	0	0	0
Feb-09	0	67	0	66	0	0	0	0	0	0	0	0	0	0	0	0
Mar-09	0	86	0	67	0	0	0	0	0	0	0	0	0	0	0	0
Apr-09	0	102	0	57	0	0	0	0	0	0	0	0	0	0	0	0
May-09	0	117	0	73	0	0	0	0	0	0	0	0	0	0	0	0
Jun-09	0	116	0	65	0	0	0	0	0	0	0	0	0	0	0	0
Jul-09	0	124	0	71	0	0	0	0	0	0	0	0	0	0	0	0
Aug-09	0	116	0	61	0	0	0	0	0	0	0	0	0	0	0	0
Sep-09	0	116	0	71	0	0	0	0	0	0	0	0	0	0	0	0
Oct-09	0	110	0	67	0	0	0	0	0	0	0	0	0	0	0	0
Nov-09	0	77	0	64	0	0	0	0	0	0	0	0	0	0	0	0
Dec-09	0	69	0	64	0	0	0	0	0	0	0	0	0	0	0	0
Jan-10	1	87	0	66	11	3	0	0	0	0	0	0	0	0	0	0
Feb-10	0	94	0	58	10	13	0	0	0	0	0	0	0	0	0	0
Mar-10	0	89	0	76	6	34	0	0	0	0	0	0	0	0	0	0
Apr-10	0	91	0	47	31	19	0	0	0	0	0	0	0	0	0	0
May-10	0	126	0	78	0	12	0	0	0	0	0	0	0	0	0	0
Jun-10	0	110	0	70	0	0	0	0	0	0	0	0	0	0	0	0
Jul-10	0	104	0	90	0	23	0	0	0	0	0	0	0	0	0	0
Aug-10	0	98	0	86	0	27	0	0	0	0	0	0	0	0	0	0
Sep-10	0	98	0	85	0	9	0	0	0	0	0	0	0	0	0	0
Oct-10	0	101	0	72	0	0	0	0	0	0	0	0	0	0	0	0
Nov-10	0	99	0	53	0	0	0	0	0	0	0	0	0	0	0	0
Dec-10	2	67	0	53	10	10	0	0	0	0	0	0	0	0	0	0
Jan-11	0	95	0	63	0	2	0	0	0	0	0	0	0	0	0	0
Feb-11	0	105	0	62	0	0	0	0	0	0	0	0	0	0	0	0
Mar-11	0	121	0	64	0	0	0	0	0	0	0	0	0	0	0	0
Apr-11	0	115	0	75	0	0	0	0	0	0	0	0	0	0	0	0
May-11	0	116	0	68	0	0	0	0	0	0	0	0	0	0	0	0
Jun-11	0	103	0	68	0	0	0	0	0	0	0	0	0	0	0	0

Attachment B-28

Baseline Actual Emission Calculations for LPG Loading Rack

	Mixed Butanes				Isobutanes				Alky Feed (primarily Butylene)				Propylene			
	Rail		Truck		Rail		Truck		Rail		Truck		Rail		Truck	
	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads	Loads	Unloads
Date	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]	[3]
Baseline Period Ends:	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Baseline Actual Emissions: Monthly	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Maximum Throughput During Baseline:	2	126	0	90	31	34	0	0	0	0	0	0	0	0	0	0
Occurs:	Dec-10	May-10	Jan-08	Jul-10	Apr-10	Mar-10	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08	Jan-08

## Attachment B-29

### Projected Actual Emission Calculations for LPG Loading Rack

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Propane Truck Loads:	1186	loads/year	Engineering estimate
n-Butane Rail Loads:	40	loads/year	Engineering estimate
n-Butane Rail Unloads:	1063	loads/year	Engineering estimate
Isobutane Rail Unloads:	1569	loads/year	Engineering estimate
Isobutane Truck Unloads:	1460	loads/year	Engineering estimate
Propylene Rail Loads:	661	loads/year	Engineering estimate

<b>Pollutant</b>	<b>Emission Factor</b>	<b>Units</b>	<b>Projected Emissions (lb/hr)</b>	<b>Projected Emissions (tpy) [1]</b>	<b>Emission Factor Reference</b>
NO <sub>x</sub>				1.24E-02	[1]
SO <sub>2</sub>				1.41E-06	[1]
CO				7.13E-03	[1]
PM				6.66E-04	[1]
PM <sub>10</sub>				6.66E-04	[1]
PM <sub>2.5</sub>				6.66E-04	[1]
VOC				1.68	[1]
H <sub>2</sub> SO <sub>4</sub>				2.12E-08	[1]
CO <sub>2</sub>				59.33	[1]
CH <sub>4</sub>				2.70E-03	[1]
N <sub>2</sub> O				5.40E-04	[1]
CO <sub>2</sub> e				59.55	[1]

[1] For emission factors, refer to Barr Engineering Memorandum, December 2011.

## Attachment B-29

### Projected Actual Emission Calculations for LPG Loading Rack

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG	
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e	Reference
A. Baseline Actual Emissions	4.36E-03	3.44E-07	3.34E-03	3.07E-04	3.07E-04	3.07E-04	0.93	5.17E-09	19	Attachment B-28
B. Capable of Accommodating	6.27E-03	3.92E-07	3.62E-03	3.38E-04	3.38E-04	3.38E-04	1.01	5.88E-09	22	See below.
C. Projected Emissions	1.24E-02	1.41E-06	7.13E-03	6.66E-04	6.66E-04	6.66E-04	1.68	2.12E-08	60	
D. Demand Growth (D=B-A)	1.91E-03	4.74E-08	2.74E-04	3.09E-05	3.09E-05	3.09E-05	0.09	7.11E-10	3	
E. Projected Actual Emissions (E=C-D)	1.05E-02	1.37E-06	6.86E-03	6.35E-04	6.35E-04	6.35E-04	1.60	2.05E-08	57	
F. Emission Increase (F=E-A)	6.10E-03	1.02E-06	3.52E-03	3.28E-04	3.28E-04	3.28E-04	0.67	1.53E-08	37	

B. Capable of Accommodating	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG (CO2e)	Notes
Emissions the Unit was Capable of Accommodating during Baseline Period (ton/yr)	6.27E-03	3.92E-07	3.62E-03	3.38E-04	3.38E-04	3.38E-04	1.01	5.88E-09	22.12	Max 12-months during baseline.



## Attachment B-30

### Emission Increase Calculations for Storage Tanks

Tank 188 (New)

Material	Tank No.	Potential Throughput (bbl/yr)	Potential VOC Emissions (lb/yr)
Black wax crude	188	3832500	2287.42
Normal operations		3832500	2038.22
Roof landing		N/A	249.2

New Yellow Wax Crude Tank

Material	Tank No.	Potential Throughput (bbl/yr)	Potential VOC Emissions (lb/yr)
Yellow wax crude	186	3832500	5512.06
Normal operations		3832500	4125.86
Roof landing		N/A	1386.2

VOC Emissions from Existing Affected Tanks

Tank	2008 (lb/yr)	2009 (lb/yr)	2010 (lb/yr)	Baseline Actual Emissions (lb/yr)	Capable of Accommodating (lb/yr)	Projected Emissions (lb/yr)	Demand Growth (lb/yr)	Projected Actual Emissions (lb/yr)	Emissions Increase (lb/yr)	Emissions Increase (ton/yr)
204	1429.07	1395.18	1555.51	1475.34	1555.51	1960.82	80.17	1880.65	405.31	0.20
212	1238.80	1374.73	1527.39	1451.06	1527.39	2027.78	76.33	1951.45	500.39	0.25
213	1296.26	1464.72	1586.74	1525.73	1586.74	2027.78	61.01	1966.77	441.04	0.22
242	13040.99	13036.05	13045.92	13040.98	13045.92	13285.47	4.93	13280.54	239.55	0.12
243	14061.67	12548.13	8908.31	10728.22	12548.13	13761.91	1819.91	11942.00	1213.78	0.61
252	10185.11	9504.65	9896.86	9700.76	9896.86	9540.80	196.10	9344.70	0.00	0.00
291	33292.37	23658.20	24358.53	24008.37	N/A	24008.37	N/A	24008.37	0.00	0.00
324	14423.39	14694.08	14356.53	14525.30	14694.08	14780.27	168.78	14611.49	86.19	0.04
325	18392.81	18445.76	17674.80	18060.28	18445.76	18531.41	385.48	18145.93	85.65	0.04
326	17683.19	17807.00	18467.00	18137.00	18467.00	17886.16	330.00	17556.16	0.00	0.00
327	97.07	0.85	3978.62	1989.73	17748.59	17853.43	15758.86	2094.57	104.84	0.05
330	15087.40	14614.32	15690.13	15152.22	15690.13	14826.43	537.91	14288.52	0.00	0.00
504	961.97	931.81	935.79	933.80	935.79	2576.87	1.99	2574.88	1641.08	0.82
321	8288.27	8287.49	8288.96	8288.23	8288.96	8421.87	0.74	8421.13	132.91	0.07
331	1170.27	1183.09	1180.84	1181.96	1183.09	1433.80	1.12	1432.68	250.71	0.13
503	932.73	936.43	930.23	933.33	936.43	481.89	3.10	478.79	0.00	0.00
<b>Total</b>	<b>151581.37</b>	<b>139882.49</b>	<b>142382.12</b>	<b>141132.31</b>	<b>136550.36</b>	<b>163405.06</b>	<b>19426.42</b>	<b>143978.63</b>	<b>5101.46</b>	<b>2.55</b>

#### Notes:

Baseline actual emissions are based on 2009-2010.

Emissions that the tanks were capable of accommodating are based on the maximum calendar year emissions during the baseline period, except for Tank 327.

Tank 327 was converted to gasoline storage during the second half of 2010 and has been in gasoline service since. The emissions that the tank was capable of accommodating are based on year-round gasoline storage, with a throughput equal to what was observed during 2010 (27,467,995 gal).

Projected emissions are based on the expected product throughput at each tank

Tesoro is proposing an emission limit of 12.00 tons of VOC per year at Tank 291. Therefore, the product demand growth exclusion does not apply since future potential emissions are used.

Greenhouse gases are not included in the calculations consistent with 40 CFR 98.253(n) (less than 0.5% methane expected to be present).

**Total VOC Emissions Increase = 6.45 ton/yr**

**Attachment B-31**  
**Potential Emission Calculations for Process Components**

Components (service)	FCCU Count	VRU Count	DDU / Dewax Count	Crude Count	TGTU Count	COB Count	Benzene NESHAP Count	Black Wax (Crude) Count	Yellow Wax (Crude) Count	LPG Loading Count	Alkylation Count	Emission  Factor [1] (kg/hr/source)   (lb/hr/source)		Control  Effectiveness [2] (%)	Emissions (lbs/yr)	Emissions (Tons/yr)
Valves (gas)	6	30	25	0	10	0	10	0	0	40	0	0.0268	0.059083	96	2,505	1.25
Valves (LL)	5	60	30	0	0	0	0	50	25	50	60	0.0109	0.024030	95	2,947	1.47
Valves (HL)	0	0	0	150	0	0	0	0	0	0	0	0.00023	0.000507	0	666	0.33
Flanges (gas)	12	75	40	0	16	0	16	0	0	100	0	0.00025	0.00055	81	238	0.12
Flanges (LL)	15	150	75	0	0	0	0	100	50	100	120	0.00025	0.00055	81	560	0.28
Flanges (HL)	0	0	0	150	0	0	0	0	0	0	0	0.00025	0.00055	81	138	0.07
Pump Seals (LL)	0	8	0	0	0	0	0	0	0	0	0	0.114	0.25	88	2,114	1.06
Pump Seals LL (Tandem)	0	4	2	0	0	0	0	24	0	4	4	0.114	0.25	100	-	-
Pump Seal (HL)	0	0	0	3	0	0	0	0	0	0	0	0.021	0.046	0	1,217	0.61
Comp. Seals (gas)	0	0	0	0	0	0	0	0	0	0	0	0.636	1.4	100	-	-
Comp. Seals (H <sub>2</sub> )	0	0	0	0	0	0	0	0	0	0	0	0.636	1.402	100	-	-
Process Drains (total)	0	15	2	0	0	0	0	10	0	0	0	0.073	0.161	100	-	-
Relief Valves (gas)	0	0	0	0	0	0	0	0	0	2	0	0.16	0.35	100	-	-
Total															10,383	5.19

Gas = material in a gaseous state at operating conditions

LL = light liquid = material in a liquid state in which the sum of the concentration of individual constituents with a vapor pressure over 0.3 kilopascals (kPa) at 20 oC is greater than or equal to 20 wt%.

HL = heavy liquid = not in gas/vapor service or light liquid service.

*In VOC service* means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. (40 CFR 60.481)

**Notes:**

[1] Protocol for Equipment Leak Emission Estimates, November 1995, Table 2-2. Refinery Average Emission Factors.

[2] Protocol for Equipment Leak Emission Estimates, November 1995, Table 5-3. Control Effectiveness for an LDAR Program at a Refinery Process Unit.

Monitored under the Consent Decree leak definition of 500 ppm, quarterly with no chance for skip monitoring. Equivalent to HON regulation.

## Attachment B-32

### Potential Emission Calculations for DDU Reactor (Venting to South Flare)

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Reactor characteristics:	2000	ft <sup>3</sup>	Design information
	1563	psia	Design information
	264.9	degrees F	Design information
	292,005	scf	Calculated
H2S Content:	2,700	ppm	Engineering estimate (plant H2 gas)
Fuel LHV:	480.8	Btu/scf	Engineering estimate (plant H2 gas)
Hours of Operation:	1	hr/yr	Assumes all gas vented in 1 hour, 1 event/year

Pollutant	Emission Factor	Units	Potential Emissions (lb/hr) [1]	Potential Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	6.80E-02	lb/MMBtu	9.55	4.77E-03	AP-42 Table 13.5-1
SO <sub>2</sub>	448.51	lb/MMscf	130.97	6.55E-02	Calculated
CO	0.37	lb/MMBtu	51.95	2.60E-02	AP-42 Table 13.5-1
PM	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	1.05	5.23E-04	AP-42 Table 1.4-2
VOC	0.14	lb/MMBtu	19.66	9.83E-03	AP-42 Table 13.5-1
H <sub>2</sub> SO <sub>4</sub>	0	lb/MMscf	0	0	Negligible
CO <sub>2</sub> [3]	38,000.00	lb/MMscf	11,096.17	5.55	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	3.18	lb/MMscf	0.93	4.64E-04	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	0.64	lb/MMscf	0.19	9.29E-05	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	38,263.94	lb/MMscf	11,173.24	5.59	40 CFR 98 Subpart A

- [1] Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Potential Firing Rate (MMBtu/hr) or  
Potential Emissions (lb/hr) = Emission Factor (lb/MMscf) x Potential Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
- [2] Emission Increase (tpy) = Potential Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
- [3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98
- [4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-32

### Potential Emission Calculations for DDU Reactor (Venting to South Flare)

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	CO2e tpy	Reference
A. Baseline Actual Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	
B. Capable of Accommodating	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C. Potential Emissions	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6	
D. Demand Growth (D=B-A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
E. Projected Actual Emissions (E=C-D)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
F. Emission Increase (F=E-A)	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6	

## Attachment B-33

### Potential Emission Calculations for New VRU Vessels (Venting to North Flare)

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Vessel characteristics:	8650	ft <sup>3</sup>	Design information
	65	psia	Design information
	100	degrees F	Design information
	40,381	scf	Calculated
H2S Content:	8,000	ppm	Engineering estimate
Fuel LHV:	2159.0	Btu/scf	Engineering estimate
Hours of Operation:	1	hr/yr	Assumes all gas vented in 1 hour, 1 event/year

Pollutant	Emission Factor	Units	Potential Emissions (lb/hr) [1]	Potential Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	6.80E-02	lb/MMBtu	5.93	2.96E-03	AP-42 Table 13.5-1
SO <sub>2</sub>	1,328.90	lb/MMscf	53.66	2.68E-02	Calculated
CO	0.37	lb/MMBtu	32.26	1.61E-02	AP-42 Table 13.5-1
PM	7.45E-03	lb/MMBtu	0.65	3.25E-04	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	0.65	3.25E-04	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	0.65	3.25E-04	AP-42 Table 1.4-2
VOC	0.14	lb/MMBtu	12.21	6.10E-03	AP-42 Table 13.5-1
H <sub>2</sub> SO <sub>4</sub>	0	lb/MMscf	0	0	Negligible
CO <sub>2</sub> [3]	38,000.00	lb/MMscf	1,534.46	0.77	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	14.28	lb/MMscf	0.58	2.88E-04	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	2.86	lb/MMscf	0.12	5.77E-05	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	39,185.18	lb/MMscf	1,582.32	0.79	40 CFR 98 Subpart A

- [1] Potential Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Potential Firing Rate (MMBtu/hr) or  
Potential Emissions (lb/hr) = Emission Factor (lb/MMscf) x Potential Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
- [2] Emission Increase (tpy) = Potential Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
- [3] Emission Factor =  $44/12 \times CC \times MW / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98
- [4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times HHV \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

## Attachment B-33

### Potential Emission Calculations for New VRU Vessels (Venting to North Flare)

	NOx tpy	SO2 tpy	CO tpy	PM tpy	PM10 tpy	PM2.5 tpy	VOC tpy	H2SO4 tpy	CO2e tpy	Reference
A. Baseline Actual Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	
B. Capable of Accommodating	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
C. Potential Emissions	0.00	0.03	0.02	0.00	0.00	0.00	0.01	0.00	1	
D. Demand Growth (D=B-A)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
E. Projected Actual Emissions (E=C-D)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
F. Emission Increase (F=E-A)	0.00	0.03	0.02	0.00	0.00	0.00	0.01	0.00	1	

## Attachment B-34

### Potential Emission Calculations for NESHAP Control System

<u>Quantity</u>	<u>Value</u>	<u>Units</u>	<u>Reference</u>
Potential Firing Rate:	2.00	Mscf/hr	Calculated
	2.17	MMBtu/hr	Engineering estimate, assuming use of Thermal Oxidizer
Fuel HHV:	1084	Btu/scf	Engineering estimate, assuming use of Thermal Oxidizer
Fuel H <sub>2</sub> S Content:	50	ppmvd	Engineering estimate
Exhaust Flow:	3862	acfm, dry @ 3% O <sub>2</sub>	Engineering estimate, assuming use of Thermal Oxidizer
Hours of Operation:	8760	hr/yr	
Assumes carbon and sulfur content in process gases are negligible. Represents worst-case between carbon adsorption and T.O.			

Pollutant	Emission Factor	Units	Projected Emissions (lb/hr) [1]	Projected Emissions (tpy) [2]	Emission Factor Reference
NO <sub>x</sub>	0.098	lb/MMBtu	0.21	0.93	AP-42 Table 1.4-1
SO <sub>2</sub>	8.31	lb/MMscf	1.66E-02	7.28E-02	Calculated
CO	8.24E-02	lb/MMBtu	0.18	0.78	AP-42 Table 1.4-1
PM	7.45E-03	lb/MMBtu	1.62E-02	7.07E-02	AP-42 Table 1.4-2
PM <sub>10</sub>	7.45E-03	lb/MMBtu	1.62E-02	7.07E-02	AP-42 Table 1.4-2
PM <sub>2.5</sub>	7.45E-03	lb/MMBtu	1.62E-02	7.07E-02	AP-42 Table 1.4-2
VOC	20	ppmvd @ 3% O <sub>2</sub>	0.19	0.84	40 CFR 61.349(a)(2)(B)
H <sub>2</sub> SO <sub>4</sub>	0.12	lb/MMscf	2.49E-04	1.09E-03	TRI calculation (1.5% of SO <sub>2</sub> emissions)
CO <sub>2</sub> [3]	142,000.00	lb/MMscf	284.00	1,243.92	40 CFR 98 Subpart C
CH <sub>4</sub> [4]	7.17	lb/MMscf	1.43E-02	6.28E-02	40 CFR 98 Subpart C
N <sub>2</sub> O [5]	1.43	lb/MMscf	2.87E-03	1.26E-02	40 CFR 98 Subpart C
CO <sub>2</sub> e [6]	142,594.95	lb/MMscf	285.19	1,249.13	40 CFR 98 Subpart A

- [1] Projected Emissions (lb/hr) = Emission Factor (lb/MMBtu) x Projected Firing Rate (MMBtu/hr) or  
 Projected Emissions (lb/hr) = Emission Factor (lb/MMscf) x Projected Firing Rate (Mscf/hr) / 1000 Mscf/MMscf
- [2] Emission Increase (tpy) = Projected Emissions (lb/hr) x Hours of Operation (hr/yr) / 2000 lb/ton
- [3] Emission Factor =  $44/12 \times \text{CC} \times \text{MW} / (849.5 \text{ scf/kg-mol}) \times 2.2 \text{ lb/kg}$  per Equation C-5 of 40 CFR 98
- [4] Emission Factor =  $0.003 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [5] Emission Factor =  $0.0006 \text{ kg/MMBtu} \times \text{HHV} \times 2.2 \text{ lb/kg}$  per Equation C-8 of 40 CFR 98
- [6] Global Warming Potentials of 1 for CO<sub>2</sub>, 21 for CH<sub>4</sub>, and 310 for N<sub>2</sub>O per Table A-1 of 40 CFR 98

**Attachment B-34**  
**Potential Emission Calculations for NESHAP Control System**

	<b>NOx</b> <b>tpy</b>	<b>SO2</b> <b>tpy</b>	<b>CO</b> <b>tpy</b>	<b>PM</b> <b>tpy</b>	<b>PM10</b> <b>tpy</b>	<b>PM2.5</b> <b>tpy</b>	<b>VOC</b> <b>tpy</b>	<b>H2SO4</b> <b>tpy</b>	<b>CO2e</b> <b>tpy</b>	<b>Reference</b>
A. Baseline Actual Emissions	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	New unit
B. Capable of Accommodating	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	N/A
C. Projected Emissions	0.93	0.07	0.78	0.07	0.07	0.07	0.84	0.00	1,249	
D. Demand Growth (D=B-A)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	
E. Projected Actual Emissions (E=C-D)	0.93	0.07	0.78	0.07	0.07	0.07	0.84	0.00	1,249	
F. Emission Increase (F=E-A)	0.93	0.07	0.78	0.07	0.07	0.07	0.84	0.00	1,249	



## Attachment B-35

### Sum of Historical Actual Monthly Emissions for Affected Units

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	GHG
	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e
	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Jan-08	28.53	77.15	20.99	10.04	8.05	5.82	14.93	3.15	43,049
Feb-08	28.44	72.58	19.39	9.17	7.35	5.32	14.49	2.81	40,154
Mar-08	32.37	86.95	20.09	10.02	8.02	5.79	14.92	3.34	42,061
Apr-08	29.30	69.65	19.35	9.45	7.57	5.47	14.72	2.77	39,584
May-08	27.90	67.80	20.34	9.79	7.84	5.67	14.95	3.20	42,247
Jun-08	29.06	76.44	22.26	9.86	7.96	5.83	14.91	3.36	47,338
Jul-08	31.89	57.37	22.54	10.21	8.23	6.01	15.12	2.48	47,098
Aug-08	33.54	70.59	21.62	8.24	6.72	5.08	15.02	3.06	44,494
Sep-08	31.09	79.57	19.98	7.79	6.33	4.77	14.69	3.36	42,509
Oct-08	32.16	80.48	20.75	8.04	6.54	4.93	14.97	3.37	43,802
Nov-08	31.72	73.98	21.04	7.64	6.23	4.72	14.79	3.15	43,232
Dec-08	31.50	68.04	21.83	7.74	6.31	4.78	15.00	2.92	43,902
Jan-09	34.46	73.40	22.37	7.89	6.46	4.93	14.73	3.03	45,624
Feb-09	34.51	62.03	20.65	7.36	6.04	4.61	14.04	2.51	40,545
Mar-09	34.65	76.19	21.85	8.31	6.79	5.14	14.63	3.15	43,797
Apr-09	34.36	80.64	21.35	8.08	6.61	5.02	14.47	3.22	43,639
May-09	39.85	93.47	22.97	8.29	6.80	5.19	14.79	3.49	46,791
Jun-09	32.69	91.68	22.25	7.94	6.51	4.96	14.51	3.63	45,128
Jul-09	38.11	84.84	22.41	8.04	6.58	5.00	14.70	3.22	45,707
Aug-09	37.57	84.80	23.16	8.17	6.70	5.11	14.76	3.25	47,033
Sep-09	33.67	83.63	22.08	7.65	6.27	4.78	14.51	3.31	45,906
Oct-09	29.83	77.22	20.97	7.34	6.00	4.59	14.63	2.92	44,031
Nov-09	28.77	76.11	20.15	7.03	5.75	4.40	11.70	2.93	42,419
Dec-09	27.57	70.14	21.41	7.25	5.95	4.57	11.98	2.80	44,480
Jan-10	30.27	74.93	21.41	7.27	5.97	4.59	16.41	2.78	42,537
Feb-10	26.42	59.39	17.61	6.49	5.30	4.03	23.42	2.25	36,087
Mar-10	17.38	37.08	15.68	5.45	4.34	3.20	12.39	1.50	33,444
Apr-10	28.29	53.23	21.80	7.12	5.85	4.51	33.52	2.35	44,637
May-10	30.30	75.38	24.39	7.24	5.92	4.53	10.23	3.53	45,186
Jun-10	29.79	75.59	24.11	7.16	5.87	4.50	11.01	3.57	44,661
Jul-10	34.58	76.14	22.19	7.39	6.06	4.66	22.99	3.70	47,311
Aug-10	33.70	76.17	24.15	7.52	6.17	4.75	9.78	3.79	47,820
Sep-10	31.93	76.20	20.95	6.97	5.71	4.38	12.89	3.45	45,794

## Attachment B-35

### Sum of Historical Actual Monthly Emissions for Affected Units

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	GHG
	tons	tons	tons	tons	tons	tons	tons	tons	tons CO <sub>2</sub> e
	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Oct-10	32.65	81.72	22.68	9.51	7.67	5.62	10.91	3.76	49,253
Nov-10	31.21	68.02	20.88	9.46	7.63	5.57	13.35	3.35	47,694
Dec-10	28.07	49.35	20.90	9.16	7.37	5.38	11.11	2.34	43,467
Jan-11	28.87	51.48	23.23	9.23	7.47	5.51	8.83	2.41	45,183
Feb-11	27.00	45.80	21.20	8.14	6.56	4.79	11.65	2.01	39,190
Mar-11	31.84	62.97	23.43	9.53	7.71	5.67	9.64	2.96	47,546
Apr-11	31.75	64.11	19.82	8.97	7.25	5.34	1.45	2.91	46,525
May-11	34.06	73.94	19.10	7.88	6.48	4.96	1.18	3.37	47,650
Jun-11	30.76	58.98	16.67	7.31	6.00	4.59	1.26	2.90	45,025

#### References

- [1] Sum of historical actual emissions from all affected emission units.

## Attachment B-36

### Calculation of 24-month Rolling Average Emissions

Date	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	GHG
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tons CO <sub>2</sub> e
	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]	[1]
Dec-09	386.76	917.37	255.91	100.67	81.81	61.25	173.97	37.21	527,284
Jan-10	387.64	916.26	256.12	99.28	80.76	60.64	174.71	37.02	527,029
Feb-10	386.63	909.66	255.23	97.94	79.74	59.99	179.18	36.74	524,995
Mar-10	379.14	884.73	253.02	95.66	77.89	58.70	177.91	35.83	520,687
Apr-10	378.63	876.52	254.25	94.50	77.04	58.22	187.31	35.61	523,214
May-10	379.83	880.31	256.27	93.22	76.07	57.65	184.95	35.78	524,683
Jun-10	380.20	879.89	257.20	91.87	75.03	56.98	183.00	35.88	523,345
Jul-10	381.55	889.27	257.02	90.45	73.94	56.31	186.94	36.49	523,451
Aug-10	381.63	892.06	258.29	90.09	73.67	56.14	184.32	36.86	525,114
Sep-10	382.05	890.38	258.78	89.68	73.36	55.95	183.42	36.91	526,757
Oct-10	382.30	891.00	259.74	90.42	73.92	56.30	181.39	37.10	529,482
Nov-10	382.04	888.02	259.67	91.33	74.62	56.72	180.68	37.20	531,713
Dec-10	380.33	878.67	259.20	92.05	75.15	57.02	178.73	36.91	531,496
Jan-11	377.53	867.71	259.63	92.72	75.65	57.31	175.77	36.60	531,275
Feb-11	373.78	859.60	259.90	93.11	75.91	57.40	174.58	36.36	530,598
Mar-11	372.37	852.99	260.69	93.72	76.37	57.66	172.09	36.26	532,472
Apr-11	371.07	844.73	259.92	94.16	76.70	57.83	165.57	36.10	533,915
May-11	368.17	834.96	257.99	93.95	76.53	57.71	158.77	36.04	534,345
Jun-11	367.20	818.61	255.20	93.64	76.28	57.53	152.14	35.67	534,293

The 24-month baseline periods are chosen as follows (last month in the 24-month period is shown):

Occurs:	Nov-10	May-11	Feb-11	May-10	May-10	May-10	Dec-10	May-11	May-11
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## Attachment B-36

### Calculation of 24-month Rolling Average Emissions

The baseline actual emissions for each affected emission unit are as follows.

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	CO <sub>2e</sub>
H-101	30.43	4.11	0.53	3.79	3.79	3.79	2.63	0.06	48,997
FCCU	149.07	579.05	74.62	60.24	50.52	38.36	1.39	33.42	240,886
F-1	50.72	3.60	34.23	3.00	3.00	3.00	2.25	0.05	42,144
F-15	2.15	0.20	1.82	0.16	0.16	0.16	0.12	0.00	2,298
F-680	3.51	0.55	4.91	0.31	0.31	0.31	0.31	0.01	6,488
F-681	3.51	0.49	4.61	0.41	0.41	0.41	0.31	0.01	5,830
SRU/TGI	1.39	242.05	1.17	0.10	0.10	0.10	0.08	2.42	3,304
SRU Flare	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0
F-701	1.18	0.14	1.23	0.08	0.08	0.08	0.09	0.00	1,684
K1s	14.55	0.01	4.86	0.31	0.31	0.31	0.49	0.00	1,957
UU3	0.00	0.00	0.00	13.72	6.29	0.03	77.49	0.00	0.00
Turbines	77.54	0.50	90.38	7.19	7.19	7.19	2.31	0.01	129,880
HRSGs	47.97	4.19	41.53	3.90	3.90	3.90	2.76	0.06	50,843
LPG Rack	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0
Loadout	17.02	0.00	0.00	0.00	0.00	0.00	17.02	0.00	0.00
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	70.57	0.00	0.00
Components	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
DDU Reactor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VRU Vessels	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NESHAP Ctrls	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>399.06</b>	<b>834.96</b>	<b>259.90</b>	<b>93.22</b>	<b>76.07</b>	<b>57.65</b>	<b>178.73</b>	<b>36.04</b>	<b>534,313</b>

#### References

[1] Baseline actual emissions are for the 24-month periods ending on the indicated dates.

**Attachment B-37**  
**Netting Calculation Table**

Determine Contemporaneous Period for the Project [2]						
Anticipated Date to Commence Construction:				5/1/2012		
Five Years Before Commencing Construction:				5/1/2007		
	Project Name [3]	Location of Emission Calcs [4]	Permit Number [5]	Date of Permit Issuance	Date of Project Change [6]	Emissions Change [7]
						SO <sub>2</sub>
						tpy
Contemporaneous Projects Creditable Increases and Decreases [8]	2007 FCU Reliability Project	2006 Notice of Intent	DAQE-AN0335028-06	10/2/2006	4/1/2007	39.00
	GHT Project	May 2007 Notice of Intent	DAQE-AN0103350030-07	10/1/2007	12/16/2008	19.24
	BenSat Unit	October 2008 Notice of Intent	DAQE-AN0103350044-09	8/12/2009	Pending	1.29
	LPG Recovery Project	February 2011 Revised Notice of Intent	DAQE-AN0103350047-11	4/25/2011	Pending	0.00
	UFU Scrubber	March 2011 Notice of Intent	DAQE-AN0103350051-11	8/25/2011	Pending	0.05
	Re-routing PDO to VRU	September 2011 Notice of Intent	Pending	Pending	Pending	1.84
	SRU Tail Gas Treatment Unit	Attachment B-14	Included in this permit action	Included in this permit action	Included in this permit action	-259.39
Sum of Contemporaneous Creditable Increases and Decreases (tpy)						-197.97

[1] Netting Calculations: use when the Project Emissions Increase exceeds the PSD Significant Emission Rates.

[2] Contemporaneous Period: 5 years before construction commences on the current project until normal operation commences for the current project.

[3] Project Name: as listed in permit application

[4] Location of Emission Calcs: identify file/path names and/or file location

[5] Permit Number: for the permitting action to make the contemporaneous project federally enforceable (i.e. permitted)

[6] Date of Project Change: date of initial startup or date of shutdown

[7] Emission increases should be calculated for all appropriate PSD/NSR pollutants. The complete list of PSD/NSR pollutants is: total suspended particulate matter (PM), particulate matter less than 10 microns (PM10), Sulfur Dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), Carbon Monoxide (CO), Ozone (using volatile organic compounds, VOC), Lead (Pb), hydrogen sulfide (H<sub>2</sub>S), total reduced sulfur compounds (TRS), reduced sulfur compounds, flourides, Chloro fluoro carbons (CFCs, 11/12/112/114/115), halons (1211, 1301, 2402), municipal waste combustor (MWC) acid gases, MWC organics, and municipal solid waste landfill emissions.

[8] Contemporaneous Projects:

Date of Project Change (see footnote 6) must be within Contemporaneous Period (see footnote 2)

Creditable Increases and Decreases: Must be federally enforceable (permitted) on and after the date construction on the current project begins.

Creditable Increases and Decreases: Cannot use an increase or decrease if it was previously relied on in issuing an enforceable PSD permit for the source.

Creditable Contemporaneous Decreases: Must take place before the date emissions increase from the current project.

Creditable Contemporaneous Decreases: Must use the lesser of actual or allowable emissions.

## Attachment B-38

### PSD Applicability Determination and Reasonable Possibility Requirements

	NO <sub>x</sub>	SO <sub>2</sub>	CO	PM	PM <sub>10</sub>	PM <sub>2.5</sub>	VOC	H <sub>2</sub> SO <sub>4</sub>	GHG
<b>Project Emission Increases</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy</b>	<b>tpy CO2e</b>
H-101	0.00	0.00	0.06	0.00	0.00	0.00	0.10	0.00	1,161
FCCU	24.93	116.51	6.93	5.70	4.90	3.89	0.00	6.72	39,826
F-1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
F-15	0.27	0.00	0.13	0.01	0.01	0.01	0.01	0.00	0
F-680	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
F-681	0.46	0.00	0.61	0.15	0.15	0.15	0.04	0.00	0
SRU/TGI	0.24	0.00	0.20	0.02	0.02	0.02	0.01	0.00	0
SRU Flare	0.00	15.03	0.00	0.00	0.00	0.00	0.00	0.15	4
F-701	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
K1s	0.32	0.00	0.11	0.01	0.01	0.01	0.01	0.00	46
Cooling Tower UU3	0.00	0.00	0.00	3.09	1.42	0.01	0.00	0.00	0
Cogen-Turbines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Cogen-HRSGs	0.00	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0
LPG Rack	0.01	0.00	0.00	0.00	0.00	0.00	0.67	0.00	37
Gasoline and Diesel Loadout	0.00	0.00	0.00	0.00	0.00	0.00	14.72	0.00	0
Tanks	0.00	0.00	0.00	0.00	0.00	0.00	6.45	0.00	0
Components	0.00	0.00	0.00	0.00	0.00	0.00	5.19	0.00	0
DDU Reactor	0.00	0.07	0.03	0.00	0.00	0.00	0.01	0.00	6
VRU Vessels	0.00	0.03	0.02	0.00	0.00	0.00	0.01	0.00	0
NESHAP Control System	0.93	0.07	0.78	0.07	0.07	0.07	0.84	0.00	0
<b>Total Project Emission Increase</b>	<b>27.15</b>	<b>131.71</b>	<b>8.86</b>	<b>9.05</b>	<b>6.57</b>	<b>4.15</b>	<b>28.12</b>	<b>6.87</b>	<b>41,080</b>
PSD Significant Emission Rate (SER)	40	40	100	25	15	10	40	7	75,000
Is Project Emission Increase Greater than PSD Significant Emission Rate?	No	<b>Yes</b>	No	No	No	No	No	No	No
Netting Analysis: Sum of Contemporaneous Creditable Increases and Decreases Excluding Project Emissions Increase (tpy)	--	-197.97	--	--	--	--	--	--	--
Net Emissions Increase [Project Emissions Increase + Netting Analysis CCI/CCD] (tpy)	--	-66.26	--	--	--	--	--	--	--
Is Net Emissions Increase Greater than PSD SER?	--	No	--	--	--	--	--	--	--

## Attachment B-38

### PSD Applicability Determination and Reasonable Possibility Requirements

#### Reasonable Possibility Requirements

	NOx	SO2	CO	PM	PM10	PM2.5	VOC	H2SO4	GHG
	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy	tpy CO2e
Project Emission Increase	27.15	131.71	8.86	9.05	6.57	4.15	28.12	6.87	N/A
Demand Growth Exclusion	29.71	73.06	85.44	49.95	44.47	37.68	2.72	4.41	
Project Emission Increase + Demand Growth Exclusion	56.86	204.77	94.30	59.00	51.04	41.83	30.85	11.28	
PSD Significant Emission Rate (SER)	40	40	100	25	15	10	40	7	
Is Project Emission Increase Greater than 1/2 of the PSD Significant Emission Rate?	Yes	Yes	No	No	No	No	Yes	Yes	
Is Project Emission Increase + Demand Growth Exclusion Greater than 1/2 of the PSD Significant Emission Rate?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is Preconstruction Determination Required?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Is Recordkeeping of Annual Actual Emissions Required?	Yes	Yes	No	No	No	No	Yes	Yes	

## Attachment B-39

### Summary of Compliance with Emission Caps

#### Emission Cap Sources (II.A.20, II.A.21, II.A.22)

Source	SO <sub>2</sub> Projected Emissions	NO <sub>x</sub> Projected Emissions	PM <sub>10</sub> Projected Emissions	Filterable PM <sub>10</sub> Projected Emissions
H-101	4.50	22.89	4.37	2.88
FCCU	761.89	174.00	96.55	47.79
F-1	3.53	53.04	3.44	2.26
F-15	0.22	2.79	0.21	0.14
F-680	0.50	4.27	0.49	0.32
F-681	0.67	5.43	0.65	0.43
F-701	0.14	1.31	0.13	0.09
K-1s	0.01	15.77	0.38	0.25
Cogen-Turbines	0.61	83.18	7.77	5.11
Cogen-HRSGs	4.68	41.63	4.55	3.00
<b>Total</b>	<b>777</b>	<b>404</b>	<b>118.6</b>	<b>62.3</b>
<b>Limit</b>	<b>1637</b>	<b>598</b>	<b>95.3 [1]</b>	<b>95.3</b>

[1] The PM10 cap is based on calculations of only filterable PM10. The PM10 emission calculations in this application include both filterable and condensable PM10 as required by federal PSD regulations.



## Attachment B-40

### HAP Emission Increase Summary

HAP	FCCU lb/yr	Combustion lb/yr	Storage Tanks lb/yr	Loading Rack lb/yr	Project Emissions Increase lb/yr
Acetaldehyde	27.77	---	---	---	27.77
Acrolein	1.52	---	---	---	1.52
Benzene	26.62	2.65	352.13	97.86	479.26
Biphenyl	---	---	0.74	0.13	0.87
1,3-Butadiene	7.02E-02	---	---	---	7.02E-02
Dichlorobenzene	---	1.52	---	---	1.52
Ethylbenzene	0.36	---	15.47	2.54	18.38
Formaldehyde	---	94.76	---	---	94.76
Hexane	---	2,274.18	95.11	291.46	2,660.74
Isopropyl benzene	---	---	0.00E+00	0.00E+00	0.00E+00
Naphthalene	1.95	---	188.43	1.02	191.40
Phenol	16.29	---	---	---	16.29
Toluene	5.03	4.30	694.56	118.17	822.06
1,2,4-Trimethylbenzene	---	---	50.58	0.97	51.54
2,2,4-Trimethylpentane	---	---	76.46	25.77	102.23
Xylenes	4.84	---	400.49	69.93	475.26
POM	0.84	0.11	---	---	0.95
Antimony	1.25	---	---	---	1.25
Arsenic	8.66E-02	0.25	---	---	0.34
Beryllium	0.10	1.52E-02	---	---	0.12
Cadmium	2.51E-03	1.39	---	---	1.39
Chromium	0.28	1.77	---	---	2.05
Cobalt	0.89	0.11	---	---	1.00
Lead	0.49	---	---	---	0.49
Manganese	9.06	0.48	---	---	9.54
Mercury	2.51E-04	0.33	---	---	0.33
Nickel	39.70	2.65	---	---	42.35
Selenium	3.13	3.03E-02	---	---	3.17
Hydrochloric Acid	2,432.39	---	---	---	2,432.39
Carbon disulfide	0.84	---	---	---	0.84
Hydrogen cyanide	1,349.29	---	---	---	1,349.29
<b>Total HAPs</b>					<b>8,789.17</b>

## Attachment B-41

### Stack HAP Emission Calculations for Coke Burn

#### FCCU/CO Boiler

Quantity	Value	Units	Reference
Increased Coke Burn:	2620	lb/hr	Attachment B-4
	2.620	1,000-lb/hr	
Hours of Operation:	8760	hr/yr	

Pollutant	Emission Factor	Units	Emission Increase (lb/hr) [1]	Emission Increase (lb/yr) [2]	Emission Factor Reference
SO <sub>2</sub>			26.60	233,016	Attachment B-4
PM			1.30	11,400	Attachment B-4
Acetaldehyde	1.21E-03	lb/1,000-lb	3.17E-03	27.77	Avg, from Bertrand & Seigell 2002
Acrolein	6.62E-05	lb/1,000-lb	1.73E-04	1.52	Avg, from Bertrand & Seigell 2002
Benzene	1.16E-03	lb/1,000-lb	3.04E-03	26.62	Avg, from Bertrand & Seigell 2002
1,3-Butadiene	3.06E-06	lb/1,000-lb	8.02E-06	7.02E-02	Avg, from Bertrand & Seigell 2002
Ethylbenzene	1.58E-05	lb/1,000-lb	4.14E-05	0.36	Avg, from Bertrand & Seigell 2002
Naphthalene	8.50E-05	lb/1,000-lb	2.23E-04	1.95	Avg, from Bertrand & Seigell 2002
Phenol	7.10E-04	lb/1,000-lb	1.86E-03	16.29	Avg, from Bertrand & Seigell 2002
POM	3.66E-05	lb/1,000-lb	9.59E-05	0.84	Avg, from Bertrand & Seigell 2002
Toluene	2.19E-04	lb/1,000-lb	5.74E-04	5.03	Avg, from Bertrand & Seigell 2002
Xylenes	2.11E-04	lb/1,000-lb	5.53E-04	4.84	Avg, from Bertrand & Seigell 2002
Antimony	5.45E-05	lb/1,000-lb	1.43E-04	1.25	Avg, from Bertrand & Seigell 2002
Arsenic	7.60	mg/kg PM	9.89E-06	8.66E-02	PM emission rate and composition
Beryllium	4.38E-06	lb/1,000-lb	1.15E-05	0.10	Avg, from Bertrand & Seigell 2002
Cadmium	0.22	mg/kg PM	2.86E-07	2.51E-03	PM emission rate and composition
Chromium	25.00	mg/kg PM	3.25E-05	0.28	PM emission rate and composition
Cobalt	3.90E-05	lb/1,000-lb	1.02E-04	0.89	Avg, from Bertrand & Seigell 2002
Lead	43.00	mg/kg PM	5.60E-05	0.49	PM emission rate and composition
Manganese	3.95E-04	lb/1,000-lb	1.03E-03	9.06	Avg, from Bertrand & Seigell 2002
Mercury	2.20E-02	mg/kg PM	2.86E-08	2.51E-04	PM emission rate and composition
Nickel	1.73E-03	lb/1,000-lb	4.53E-03	39.70	Avg, from Bertrand & Seigell 2002
Selenium	275.00	mg/kg PM	3.58E-04	3.13	PM emission rate and composition
Hydrochloric acid	0.11	lb/1,000-lb	0.28	2,432.39	Avg, from Bertrand & Seigell 2002
Carbon disulfide	3.68E-05	lb/1,000-lb	9.64E-05	0.84	Avg, from Bertrand & Seigell 2002
Hydrogen cyanide	5.88E-02	lb/1,000-lb	0.15	1,349.29	Avg, from Bertrand & Seigell 2002

[1] Emission Increase (lb/hr) = Emission Factor (lb/1,000-lb) x Increased Coke Burn (lb/yr) / Hours of Operation (hr/yr) OR  
Emission Increase (lb/hr) = Emission Factor (mg/kg PM) x PM Emission Factor (lb/1,000-lb) / 10<sup>6</sup> mg/kg  
x Increased Coke Burn (lb/yr) / Hours of Operation (hr/yr)

[2] Emission Increase (lb/yr) = Emission Increase (lb/hr) x Hours of Operation (hr/yr)

**Attachment B-42**  
**Stack HAP Emission**  
**Calculations for Fuel Gas**  
**Combustion**

HAP	Emission Factor [1] (lb/MMBtu)	Crude Unit Furnace H-101 (lb/yr)	FCCU/CO Boiler (Natural Gas) (lbs/yr)	Ultraformer Unit Furnace F-1 (lb/yr)	UFU Regeneration Heater (lb/yr)
Benzene	2.06E-06	7.45E-02	0.00E+00	0.00E+00	1.14E-02
Dichlorobenzene	1.18E-06	4.26E-02	0.00E+00	0.00E+00	6.49E-03
Formaldehyde	7.35E-05	2.66	0.00E+00	0.00E+00	0.41
Hexane	1.76E-03	63.84	0.00E+00	0.00E+00	9.74
Napthalene	5.98E-07	2.16E-02	0.00E+00	0.00E+00	3.30E-03
Toluene	3.33E-06	0.12	0.00E+00	0.00E+00	1.84E-02
POM	8.65E-08	3.13E-03	0.00E+00	0.00E+00	4.77E-04
Arsenic	1.96E-07	7.09E-03	0.00E+00	0.00E+00	1.08E-03
Beryllium	1.18E-08	4.26E-04	0.00E+00	0.00E+00	6.49E-05
Cadmium	1.08E-06	3.90E-02	0.00E+00	0.00E+00	5.95E-03
Chromium	1.37E-06	4.97E-02	0.00E+00	0.00E+00	7.58E-03
Cobalt	8.24E-08	2.98E-03	0.00E+00	0.00E+00	4.55E-04
Manganese	3.73E-07	1.35E-02	0.00E+00	0.00E+00	2.06E-03
Mercury	2.55E-07	9.22E-03	0.00E+00	0.00E+00	1.41E-03
Nickel	2.06E-06	7.45E-02	0.00E+00	0.00E+00	1.14E-02
Selenium	2.35E-08	8.51E-04	0.00E+00	0.00E+00	1.30E-04

[1] Source: AP-42, 5th Edition, Section 1.4, Natural Gas Combustion, Tables 1.4-3 and 1.4-4, 7/98

**Attachment B-42**  
**Stack HAP Emission**  
**Calculations for Fuel Gas**  
**Combustion**

HAP	Emission Factor [1] (lb/MMBtu)	DDU Charge Heater F-680 (lb/yr)	DDU Rerun Reboiler F-681 (lb/yr)	Gasoline Hydrotreater Process Heater (lb/yr)	Ultraformer Compressors (K1s) (lb/yr)
Benzene	2.06E-06	0.00E+00	3.04E-02	0.00E+00	1.62E-03
Dichlorobenzene	1.18E-06	0.00E+00	1.74E-02	0.00E+00	9.28E-04
Formaldehyde	7.35E-05	0.00E+00	1.09	0.00E+00	5.80E-02
Hexane	1.76E-03	0.00E+00	26.06	0.00E+00	1.39
Napthalene	5.98E-07	0.00E+00	8.83E-03	0.00E+00	4.72E-04
Toluene	3.33E-06	0.00E+00	4.92E-02	0.00E+00	2.63E-03
POM	8.65E-08	0.00E+00	1.28E-03	0.00E+00	6.82E-05
Arsenic	1.96E-07	0.00E+00	2.90E-03	0.00E+00	1.55E-04
Beryllium	1.18E-08	0.00E+00	1.74E-04	0.00E+00	9.28E-06
Cadmium	1.08E-06	0.00E+00	1.59E-02	0.00E+00	8.51E-04
Chromium	1.37E-06	0.00E+00	2.03E-02	0.00E+00	1.08E-03
Cobalt	8.24E-08	0.00E+00	1.22E-03	0.00E+00	6.50E-05
Manganese	3.73E-07	0.00E+00	5.50E-03	0.00E+00	2.94E-04
Mercury	2.55E-07	0.00E+00	3.76E-03	0.00E+00	2.01E-04
Nickel	2.06E-06	0.00E+00	3.04E-02	0.00E+00	1.62E-03
Selenium	2.35E-08	0.00E+00	3.47E-04	0.00E+00	1.86E-05

[1] Source: AP-42, 5th Edition, Section 1.4, I

**Attachment B-42**  
**Stack HAP Emission**  
**Calculations for Fuel Gas**  
**Combustion**

HAP	Emission Factor [1] (lb/MMBtu)	Turbines (lb/yr)	Cogeneration Unit HRSGs (lb/yr)	Total HAP Emissions (lb/yr)
Benzene	2.06E-06	2.28E-02	2.51	2.65
Dichlorobenzene	1.18E-06	1.30E-02	1.44	1.52
Formaldehyde	7.35E-05	0.81	89.73	94.76
Hexane	1.76E-03	19.54	2,153.61	2,274.18
Napthalene	5.98E-07	6.62E-03	0.73	0.77
Toluene	3.33E-06	3.69E-02	4.07	4.30
POM	8.65E-08	9.57E-04	0.11	0.11
Arsenic	1.96E-07	2.17E-03	0.24	0.25
Beryllium	1.18E-08	1.30E-04	1.44E-02	1.52E-02
Cadmium	1.08E-06	1.19E-02	1.32	1.39
Chromium	1.37E-06	1.52E-02	1.68	1.77
Cobalt	8.24E-08	9.12E-04	0.10	0.11
Manganese	3.73E-07	4.12E-03	0.45	0.48
Mercury	2.55E-07	2.82E-03	0.31	0.33
Nickel	2.06E-06	2.28E-02	2.51	2.65
Selenium	2.35E-08	2.60E-04	2.87E-02	3.03E-02

[1] Source: AP-42, 5th Edition, Section 1.4, I

## Attachment B-43

### HAP Emission Calculations for Loadout Increases

Material	Component	Liquid Wt %	Vapor Wt %	Emissions lb/yr
Distillate	1,2,4-Trimethylbenzene	0.53	0.12	0.9
	2,2,4-Trimethylpentane	0.00	0.00	0.0
	Benzene	0.00	0.00	0.0
	Biphenyl	0.26	0.02	0.1
	Ethylbenzene	0.00	0.00	0.0
	Hexane	0.00	0.00	0.0
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.30	0.12	1.0
	Toluene	0.00	0.00	0.0
	Xylenes	0.34	7.12	57.6
	Non-HAP VOC	98.58	92.63	749.7
ULP 91 CNV	1,2,4-Trimethylbenzene	0.83	0.00	0.0
	2,2,4-Trimethylpentane	1.20	0.21	25.8
	Benzene	2.32	0.79	97.9
	Biphenyl	0.00	0.00	0.0
	Ethylbenzene	0.65	0.02	2.5
	Hexane	4.29	2.34	291.5
	Isopropyl benzene	0.00	0.00	0.0
	Naphthalene	0.19	0.00	0.0
	Toluene	9.88	0.95	118.2
	Xylenes	3.66	0.10	12.3
	Non-HAP VOC	76.98	95.59	11888.9
Total	1,2,4-Trimethylbenzene			1.0
	2,2,4-Trimethylpentane			25.8
	Benzene			97.9
	Biphenyl			0.1
	Ethylbenzene			2.5
	Hexane			291.5
	Isopropyl benzene			0.0
	Naphthalene			1.0
	Toluene			118.2
	Xylenes			69.9
	Non-HAP VOC			12638.6
	Total VOC			13246.4
	<b>Total HAP Increase</b>			<b>607.8</b>

## Attachment B-44

### HAP Emission Calculations for Tanks Increases

HAP Emissions Increase from Affected Tanks (lb/yr)

Tank	1,2,4- Trimethyl- benzene	2,2,4- Trimethyl- pentane (isooctane)	Benzene	Biphenyl	Ethyl- benzene	Hexane	Naphthalene	Toluene	Xylenes (mixed isomers)
186	0.00	0.00	184.63	0.00	0.00	0.00	99.92	316.08	129.48
188	0.00	0.00	117.56	0.00	0.00	0.00	84.65	206.63	89.10
204	9.26	0.00	0.00	0.04	0.00	0.00	0.62	0.00	27.76
212	11.62	0.00	0.00	0.05	0.00	0.00	0.79	0.00	34.28
213	10.12	0.00	0.00	0.04	0.00	0.00	0.68	0.00	30.22
242	6.30	0.26	1.37	0.00	2.58	1.50	0.81	8.52	15.35
243	0.10	3.67	11.75	0.00	0.34	20.19	0.00	9.05	1.61
252	0.09	0.15	0.00	0.00	0.11	0.00	0.00	1.04	0.67
291	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
324	2.07	3.44	0.00	0.00	1.27	0.00	0.11	10.63	7.95
325	2.07	3.41	0.00	0.00	1.25	0.00	0.09	10.56	7.90
326	0.65	1.79	0.88	0.00	0.51	0.25	0.18	7.28	2.90
327	0.00	0.00	0.00	0.61	0.00	0.00	0.16	0.00	0.00
330	1.73	4.81	2.96	0.00	1.30	2.82	0.41	18.48	7.45
504	6.57	19.69	32.98	0.00	8.12	70.36	0.00	90.97	45.84
321	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
331	0.00	39.25	0.00	0.00	0.00	0.00	0.00	15.33	0.00
503	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>Total</b>	<b>50.58</b>	<b>76.46</b>	<b>352.13</b>	<b>0.74</b>	<b>15.47</b>	<b>95.11</b>	<b>188.43</b>	<b>694.56</b>	<b>400.49</b>

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	186
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Yellow wax crude

**Tank Dimensions**

Diameter (ft):		100.00
Volume (gallons):		2,100,000.00
Turnovers:		76.65
Self Supp. Roof? (y/n):	N	
No. of Columns:		6.00
Eff. Col. Diam. (ft):		1.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal:	Shoe-mounted

**Deck Characteristics**

Deck Fitting Category:	Typical
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	6
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	32
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Heated Tank, UT (Avg Atmospheric Pressure = 14.7 psia)



## TANKS 4.0.9d

### Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 186 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Yellow Wax Crude	Jan	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Feb	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Mar	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Apr	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	May	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Jun	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Jul	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	

Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Aug	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Sep	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Oct	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Nov	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Yellow Wax Crude	Dec	180.01	180.01	180.01	180.02	6.7389	N/A	N/A	50.0000			285.40	Option 4: RVP=1.6
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.0517	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0053	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.0828	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.5362	N/A	N/A	45.8583	0.9266	0.8311	326.34	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.0291	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 186 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680	40.5680
Seal Factor A (lb-mole/ft-yr):	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389	6.7389
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Withdrawal Losses (lb):	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931	131.0931
Number of Columns:	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000
Effective Column Diameter (ft):	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Net Throughput (gal/mo.):	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Average Organic Liquid Density (lb/gal):	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440	6.8440
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Deck Fitting Losses (lb):	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606	172.1606
Value of Vapor Pressure Function:	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521	0.1521
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Total Losses (lb):	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217	343.8217

Roof Fitting/Status	Quantity	KF <sub>a</sub> (lb-mole/yr)	Roof Fitting Loss Factors		m	Losses(lb)
			KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))			
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90		1.20	109.5337
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40		1.10	42.5964
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	6	47.00	0.00		0.00	858.0139
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00		0.00	231.2378
Roof Leg or Hanger Well/Adjustable	32	7.90	0.00		0.00	769.1699
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00		0.00	36.5112
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20		0.94	18.8641

## TANKS 4.0.9d

### Emissions Report - Detail Format

**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**186 - Internal Floating Roof Tank  
Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Yellow Wax Crude	486.82	1,573.12	2,065.93	0.00	4,125.86
Benzene	25.19	6.14	106.88	0.00	138.20
Naphthalene	2.56	61.35	10.87	0.00	74.79
Toluene	40.29	25.33	170.98	0.00	236.59
Unidentified Components	404.62	1,457.65	1,717.09	0.00	3,579.36
Xylenes (mixed isomers)	14.16	22.65	60.10	0.00	96.92

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	188 (New tank, heated)
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Black wax crude

**Tank Dimensions**

Diameter (ft):		100.00
Volume (gallons):		2,100,000.00
Turnovers:		76.65
Self Supp. Roof? (y/n):	N	
No. of Columns:		6.00
Eff. Col. Diam. (ft):		1.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal:	Shoe-mounted

**Deck Characteristics**

Deck Fitting Category:	Typical
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	6
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Adjustable	32
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1

Meterological Data used in Emissions Calculations: Heated Tank, UT (Avg Atmospheric Pressure = 14.7 psia)

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Liquid Contents of Storage Tank

**188 (New tank, heated) - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Black Wax Crude-Speciatted	Jan	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	Feb	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	Mar	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	Apr	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	May	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	Jun	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciatted	Jul	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	

Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciati	Aug	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciati	Sep	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciati	Oct	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciati	Nov	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Black Wax Crude-Speciati	Dec	180.01	180.01	180.01	180.02	1.2100	N/A	N/A	50.0000			270.00	
Benzene						15.6610	N/A	N/A	78.1100	0.0039	0.2726	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Naphthalene						0.1593	N/A	N/A	128.2000	0.0390	0.0277	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						6.0688	N/A	N/A	92.1300	0.0161	0.4361	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						0.7459	N/A	N/A	10.9077	0.9266	0.1104	304.89	
Xylenes (mixed isomers)						2.3853	N/A	N/A	106.1700	0.0144	0.1533	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 188 (New tank, heated) - Internal Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257	5.7257
Seal Factor A (lb-mole/ft-yr):	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000	1.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100	1.2100
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Withdrawal Losses (lb):	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275	139.8275
Number of Columns:	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000	6.0000
Effective Column Diameter (ft):	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Net Throughput (gal/mo.):	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000	13,413,750.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060	0.0060
Average Organic Liquid Density (lb/gal):	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000	7.3000
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Deck Fitting Losses (lb):	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985	24.2985
Value of Vapor Pressure Function:	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215	0.0215
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000	679.0000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000
Vapor Molecular Weight (lb/lb-mole):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Product Factor:	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Total Losses (lb):	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517	169.8517

Roof Fitting/Status	Quantity	KF <sub>a</sub> (lb-mole/yr)	Roof Fitting Loss Factors		m	Losses(lb)
			KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))			
Access Hatch (24-in. Diam.)/Unbolted Cover, Ungasketed	1	36.00	5.90		1.20	15.4594
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40		1.10	6.0120
Column Well (24-in. Diam.)/Built-Up Col.-Sliding Cover, Ungask.	6	47.00	0.00		0.00	121.0987
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00		0.00	32.6365
Roof Leg or Hanger Well/Adjustable	32	7.90	0.00		0.00	108.5594
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00		0.00	5.1531
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20		0.94	2.6625

## TANKS 4.0.9d

### Emissions Report - Detail Format



**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**188 (New tank, heated) - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Black Wax Crude-Speciaded	68.71	1,677.93	291.58	0.00	2,038.22
Benzene	18.73	6.54	79.48	0.00	104.75
Naphthalene	1.91	65.44	8.08	0.00	75.43
Toluene	29.96	27.01	127.14	0.00	184.12
Unidentified Components	7.58	1,554.77	32.18	0.00	1,594.53
Xylenes (mixed isomers)	10.53	24.16	44.70	0.00	79.39

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	204
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	HISULF-2

**Tank Dimensions**

Shell Height (ft):	30.00
Diameter (ft):	114.50
Liquid Height (ft) :	30.00
Avg. Liquid Height (ft):	13.00
Volume (gallons):	2,309,000.00
Turnovers:	55.67
Net Throughput(gal/yr):	128,547,160.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Roof Characteristics**

Type:	Cone
Height (ft)	3.60
Slope (ft/ft) (Cone Roof)	0.06

**Breather Vent Settings**

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 204 - Vertical Fixed Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jan	42.19	38.38	46.01	51.98	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0097	0.0082	0.0114	120.1900	0.0053	0.0216	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0031	0.0028	0.0030	132.4907	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0470	0.0405	0.0543	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Feb	45.35	40.84	49.87	51.98	0.0038	0.0032	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0111	0.0091	0.0135	120.1900	0.0053	0.0220	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0013	0.0010	0.0016	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0035	0.0032	0.0034	132.4914	0.9858	0.9084	189.45	
Xylenes (mixed isomers)						0.0530	0.0446	0.0627	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Mar	49.25	43.96	54.55	51.98	0.0044	0.0037	0.0054	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0131	0.0105	0.0164	120.1900	0.0053	0.0227	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0015	0.0012	0.0019	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0040	0.0036	0.0039	132.5359	0.9858	0.9067	189.45	
Xylenes (mixed isomers)						0.0613	0.0503	0.0744	106.1700	0.0034	0.0690	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Apr	53.24	46.98	59.49	51.98	0.0051	0.0041	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0155	0.0119	0.0200	120.1900	0.0053	0.0229	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0018	0.0014	0.0024	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0047	0.0042	0.0045	132.5097	0.9858	0.9072	189.45	
Xylenes (mixed isomers)						0.0710	0.0564	0.0888	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	May	57.74	50.54	64.93	51.98	0.0060	0.0046	0.0077	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0187	0.0139	0.0248	120.1900	0.0053	0.0235	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0022	0.0016	0.0031	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0055	0.0049	0.0053	132.5194	0.9858	0.9066	189.45	
Xylenes (mixed isomers)						0.0834	0.0643	0.1073	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jun	62.65	54.94	70.36	51.98	0.0072	0.0055	0.0091	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0227	0.0166	0.0306	120.1900	0.0053	0.0241	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0028	0.0020	0.0039	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0065	0.0058	0.0062	132.5376	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0991	0.0755	0.1289	106.1700	0.0034	0.0685	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jul	66.53	58.63	74.43	51.98	0.0081	0.0062	0.0103	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0264	0.0193	0.0357	120.1900	0.0053	0.0247	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0033	0.0023	0.0046	128.2000	0.0030	0.0018	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0074	0.0065	0.0071	132.5630	0.9858	0.9045	189.45	

Xylenes (mixed isomers)						0.1133	0.0861	0.1476	106.1700	0.0034	0.0689	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Aug	65.15	57.72	72.57	51.98	0.0078	0.0060	0.0098	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0250	0.0186	0.0333	120.1900	0.0053	0.0245	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0031	0.0022	0.0043	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0071	0.0063	0.0068	132.5495	0.9858	0.9050	189.45	
Xylenes (mixed isomers)						0.1081	0.0834	0.1388	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Sep	59.98	52.93	67.04	51.98	0.0065	0.0051	0.0083	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0204	0.0153	0.0270	120.1900	0.0053	0.0239	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0025	0.0018	0.0034	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0059	0.0053	0.0057	132.5455	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0903	0.0702	0.1153	106.1700	0.0034	0.0688	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Oct	54.07	48.01	60.13	51.98	0.0053	0.0042	0.0065	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0161	0.0125	0.0205	120.1900	0.0053	0.0230	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0019	0.0014	0.0025	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0048	0.0043	0.0047	132.5065	0.9858	0.9073	189.45	
Xylenes (mixed isomers)						0.0732	0.0586	0.0908	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Nov	48.04	43.61	52.46	51.98	0.0042	0.0036	0.0050	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0125	0.0103	0.0150	120.1900	0.0053	0.0224	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0014	0.0012	0.0018	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0038	0.0035	0.0038	132.5176	0.9858	0.9074	189.45	
Xylenes (mixed isomers)						0.0586	0.0496	0.0690	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Dec	42.89	39.34	46.44	51.98	0.0035	0.0031	0.0040	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0100	0.0085	0.0116	120.1900	0.0053	0.0217	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0032	0.0029	0.0031	132.4876	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0483	0.0421	0.0552	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 204 - Vertical Fixed Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	14.5016	17.3226	25.2712	33.2777	45.6821	55.0412	65.1436	58.9591	46.1468	34.2948	19.7510	13.8585
Vapor Space Volume (cu ft):	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Vented Vapor Saturation Factor:	0.9967	0.9963	0.9958	0.9951	0.9942	0.9931	0.9922	0.9925	0.9938	0.9949	0.9959	0.9966
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459	187,401.1459
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Space Outage (ft):	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000
Tank Shell Height (ft):	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
Average Liquid Height (ft):	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000	13.0000
Roof Outage (ft):	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000
Roof Outage (Cone Roof)												
Roof Outage (ft):	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000	1.2000
Roof Height (ft):	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000	3.6000
Roof Slope (ft/ft):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Shell Radius (ft):	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500	57.2500
Vapor Density												
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Daily Avg. Liquid Surface Temp. (deg. R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Average Ambient Temp. (deg. F):	27.8500	34.1000	41.8000	49.6000	58.7500	69.1000	77.9500	75.6000	65.1000	53.1500	40.8500	29.7000
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	617.0902	922.6212	1,303.0279	1,713.2580	2,067.0141	2,335.4245	2,325.5891	2,064.7932	1,660.5912	1,172.9472	710.0503	533.0136
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Daily Vapor Temperature Range (deg. R):	15.2493	18.0717	21.1784	25.0031	28.7750	30.8446	31.5898	29.7004	28.2084	24.2312	17.7078	14.2011
Daily Vapor Pressure Range (psia):	0.0008	0.0013	0.0018	0.0023	0.0031	0.0036	0.0041	0.0037	0.0032	0.0023	0.0014	0.0009
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031	0.0032	0.0037	0.0041	0.0046	0.0055	0.0062	0.0060	0.0051	0.0042	0.0036	0.0031
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0039	0.0045	0.0054	0.0064	0.0077	0.0091	0.0103	0.0098	0.0083	0.0065	0.0050	0.0040
Daily Avg. Liquid Surface Temp. (deg R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Min. Liquid Surface Temp. (deg R):	498.0506	500.5054	503.6276	506.6543	510.2125	514.6095	518.3040	517.3921	512.6023	507.6837	503.2808	499.0138
Daily Max. Liquid Surface Temp. (deg R):	505.6753	509.5412	514.2168	519.1559	524.5999	530.0318	534.0989	532.2423	526.7065	519.7993	512.1348	506.1143
Daily Ambient Temp. Range (deg. R):	17.1000	19.0000	20.8000	23.4000	26.3000	27.4000	28.5000	27.6000	28.2000	25.9000	19.9000	16.2000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9967	0.9963	0.9958	0.9951	0.9942	0.9931	0.9922	0.9925	0.9938	0.9949	0.9959	0.9966
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035

Vapor Space Outage (ft):	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000	18.2000
Working Losses (lb):	79.7017	90.0521	102.8212	120.4065	141.4657	167.5594	190.2556	182.1601	151.9842	124.3196	98.8441	81.9978
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Net Throughput (gal/mo.):	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300
Annual Turnovers:	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722	55.6722
Turnover Factor:	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055	0.7055
Maximum Liquid Volume (gal):	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000	2,309,000.0000
Maximum Liquid Height (ft):	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000	30.0000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	94.2033	107.3746	128.0924	153.6842	187.1478	222.6006	255.3993	241.1191	198.1310	158.6143	118.5951	95.8563

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**204 - Vertical Fixed Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1,531.57	429.25	1,960.82
1,2,4-Trimethylbenzene	35.80	10.12	45.92
Biphenyl	0.16	0.05	0.21
Naphthalene	2.44	0.70	3.14
Unidentified Components	1,388.27	388.98	1,777.25
Xylenes (mixed isomers)	104.89	29.41	134.30

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	212
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	LSD

**Tank Dimensions**

Shell Height (ft):	29.50
Diameter (ft):	117.00
Liquid Height (ft) :	27.00
Avg. Liquid Height (ft):	12.00
Volume (gallons):	2,378,000.00
Turnovers:	54.06
Net Throughput(gal/yr):	128,547,160.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Roof Characteristics**

Type:	Cone
Height (ft)	3.70
Slope (ft/ft) (Cone Roof)	0.06

**Breather Vent Settings**

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)



# **TANKS 4.0.9d** **Emissions Report - Detail Format** **Liquid Contents of Storage Tank**

## **212 - Vertical Fixed Roof Tank** **Salt Lake City, Utah**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jan	42.19	38.38	46.01	51.98	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0097	0.0082	0.0114	120.1900	0.0053	0.0216	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0031	0.0028	0.0030	132.4907	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0470	0.0405	0.0543	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Feb	45.35	40.84	49.87	51.98	0.0038	0.0032	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0111	0.0091	0.0135	120.1900	0.0053	0.0220	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0013	0.0010	0.0016	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0035	0.0032	0.0034	132.4914	0.9858	0.9084	189.45	
Xylenes (mixed isomers)						0.0530	0.0446	0.0627	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Mar	49.25	43.96	54.55	51.98	0.0044	0.0037	0.0054	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0131	0.0105	0.0164	120.1900	0.0053	0.0227	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0015	0.0012	0.0019	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0040	0.0036	0.0039	132.5359	0.9858	0.9067	189.45	
Xylenes (mixed isomers)						0.0613	0.0503	0.0744	106.1700	0.0034	0.0690	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Apr	53.24	46.98	59.49	51.98	0.0051	0.0041	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0155	0.0119	0.0200	120.1900	0.0053	0.0229	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0018	0.0014	0.0024	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0047	0.0042	0.0045	132.5097	0.9858	0.9072	189.45	
Xylenes (mixed isomers)						0.0710	0.0564	0.0888	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	May	57.74	50.54	64.93	51.98	0.0060	0.0046	0.0077	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0187	0.0139	0.0248	120.1900	0.0053	0.0235	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0022	0.0016	0.0031	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0055	0.0049	0.0053	132.5194	0.9858	0.9066	189.45	
Xylenes (mixed isomers)						0.0834	0.0643	0.1073	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jun	62.65	54.94	70.36	51.98	0.0072	0.0055	0.0091	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0227	0.0166	0.0306	120.1900	0.0053	0.0241	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0028	0.0020	0.0039	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0065	0.0058	0.0062	132.5376	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0991	0.0755	0.1289	106.1700	0.0034	0.0685	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jul	66.53	58.63	74.43	51.98	0.0081	0.0062	0.0103	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0264	0.0193	0.0357	120.1900	0.0053	0.0247	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0033	0.0023	0.0046	128.2000	0.0030	0.0018	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0074	0.0065	0.0071	132.5630	0.9858	0.9045	189.45	

Xylenes (mixed isomers)						0.1133	0.0861	0.1476	106.1700	0.0034	0.0689	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Aug	65.15	57.72	72.57	51.98	0.0078	0.0060	0.0098	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0250	0.0186	0.0333	120.1900	0.0053	0.0245	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0031	0.0022	0.0043	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0071	0.0063	0.0068	132.5495	0.9858	0.9050	189.45	
Xylenes (mixed isomers)						0.1081	0.0834	0.1388	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Sep	59.98	52.93	67.04	51.98	0.0065	0.0051	0.0083	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0204	0.0153	0.0270	120.1900	0.0053	0.0239	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0025	0.0018	0.0034	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0059	0.0053	0.0057	132.5455	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0903	0.0702	0.1153	106.1700	0.0034	0.0688	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Oct	54.07	48.01	60.13	51.98	0.0053	0.0042	0.0065	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0161	0.0125	0.0205	120.1900	0.0053	0.0230	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0019	0.0014	0.0025	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0048	0.0043	0.0047	132.5065	0.9858	0.9073	189.45	
Xylenes (mixed isomers)						0.0732	0.0586	0.0908	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Nov	48.04	43.61	52.46	51.98	0.0042	0.0036	0.0050	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0125	0.0103	0.0150	120.1900	0.0053	0.0224	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0014	0.0012	0.0018	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0038	0.0035	0.0038	132.5176	0.9858	0.9074	189.45	
Xylenes (mixed isomers)						0.0586	0.0496	0.0690	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Dec	42.89	39.34	46.44	51.98	0.0035	0.0031	0.0040	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0100	0.0085	0.0116	120.1900	0.0053	0.0217	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0032	0.0029	0.0031	132.4876	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0483	0.0421	0.0552	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 212 - Vertical Fixed Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	15.5840	18.6153	27.1567	35.7598	49.0882	59.1433	69.9966	63.3520	49.5869	36.8526	21.2247	14.8928
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Tank Shell Height (ft):	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000
Average Liquid Height (ft):	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Outage (Cone Roof)												
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Height (ft):	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000
Roof Slope (ft/ft):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Shell Radius (ft):	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Daily Avg. Liquid Surface Temp. (deg. R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Average Ambient Temp. (deg. F):	27.8500	34.1000	41.8000	49.6000	58.7500	69.1000	77.9500	75.6000	65.1000	53.1500	40.8500	29.7000
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	617.0902	922.6212	1,303.0279	1,713.2580	2,067.0141	2,335.4245	2,325.5891	2,064.7932	1,660.5912	1,172.9472	710.0503	533.0136
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Daily Vapor Temperature Range (deg. R):	15.2493	18.0717	21.1784	25.0031	28.7750	30.8446	31.5898	29.7004	28.2084	24.2312	17.7078	14.2011
Daily Vapor Pressure Range (psia):	0.0008	0.0013	0.0018	0.0023	0.0031	0.0036	0.0041	0.0037	0.0032	0.0023	0.0014	0.0009
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031	0.0032	0.0037	0.0041	0.0046	0.0055	0.0062	0.0060	0.0051	0.0042	0.0036	0.0031
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0039	0.0045	0.0054	0.0064	0.0077	0.0091	0.0103	0.0098	0.0083	0.0065	0.0050	0.0040
Daily Avg. Liquid Surface Temp. (deg R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Min. Liquid Surface Temp. (deg R):	498.0506	500.5054	503.6276	506.6543	510.2125	514.6095	518.3040	517.3921	512.6023	507.6837	503.2808	499.0138
Daily Max. Liquid Surface Temp. (deg R):	505.6753	509.5412	514.2168	519.1559	524.5999	530.0318	534.0989	532.2423	526.7065	519.7993	512.1348	506.1143
Daily Ambient Temp. Range (deg. R):	17.1000	19.0000	20.8000	23.4000	26.3000	27.4000	28.5000	27.6000	28.2000	25.9000	19.9000	16.2000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035

Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Working Losses (lb):	81.5208	92.1074	105.1680	123.1546	144.6945	171.3837	194.5980	186.3177	155.4530	127.1570	101.1001	83.8693
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Net Throughput (gal/mo.):	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300
Annual Turnovers:	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568
Turnover Factor:	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216
Maximum Liquid Volume (gal):	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000
Maximum Liquid Height (ft):	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	97.1048	110.7227	132.3247	158.9144	193.7827	230.5270	264.5947	249.6696	205.0399	164.0096	122.3248	98.7622

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**212 - Vertical Fixed Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1,566.52	461.25	2,027.78
1,2,4-Trimethylbenzene	36.62	10.87	47.49
Biphenyl	0.16	0.05	0.21
Naphthalene	2.50	0.75	3.25
Unidentified Components	1,419.96	417.98	1,837.94
Xylenes (mixed isomers)	107.28	31.60	138.88

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	213
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Vertical Fixed Roof Tank
Description:	LSD

**Tank Dimensions**

Shell Height (ft):	29.50
Diameter (ft):	117.00
Liquid Height (ft) :	27.00
Avg. Liquid Height (ft):	12.00
Volume (gallons):	2,378,000.00
Turnovers:	54.06
Net Throughput(gal/yr):	128,547,160.00
Is Tank Heated (y/n):	N

**Paint Characteristics**

Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Roof Characteristics**

Type:	Cone
Height (ft)	3.70
Slope (ft/ft) (Cone Roof)	0.06

**Breather Vent Settings**

Vacuum Settings (psig):	0.00
Pressure Settings (psig)	0.00

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 213 - Vertical Fixed Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Distillate fuel oil no. 2	Jan	42.19	38.38	46.01	51.98	0.0034	0.0031	0.0039	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0097	0.0082	0.0114	120.1900	0.0053	0.0216	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0031	0.0028	0.0030	132.4907	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0470	0.0405	0.0543	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Feb	45.35	40.84	49.87	51.98	0.0038	0.0032	0.0045	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0111	0.0091	0.0135	120.1900	0.0053	0.0220	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0013	0.0010	0.0016	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0035	0.0032	0.0034	132.4914	0.9858	0.9084	189.45	
Xylenes (mixed isomers)						0.0530	0.0446	0.0627	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Mar	49.25	43.96	54.55	51.98	0.0044	0.0037	0.0054	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0131	0.0105	0.0164	120.1900	0.0053	0.0227	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0015	0.0012	0.0019	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0040	0.0036	0.0039	132.5359	0.9858	0.9067	189.45	
Xylenes (mixed isomers)						0.0613	0.0503	0.0744	106.1700	0.0034	0.0690	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Apr	53.24	46.98	59.49	51.98	0.0051	0.0041	0.0064	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0155	0.0119	0.0200	120.1900	0.0053	0.0229	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0018	0.0014	0.0024	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0047	0.0042	0.0045	132.5097	0.9858	0.9072	189.45	
Xylenes (mixed isomers)						0.0710	0.0564	0.0888	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	May	57.74	50.54	64.93	51.98	0.0060	0.0046	0.0077	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0187	0.0139	0.0248	120.1900	0.0053	0.0235	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0022	0.0016	0.0031	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0055	0.0049	0.0053	132.5194	0.9858	0.9066	189.45	
Xylenes (mixed isomers)						0.0834	0.0643	0.1073	106.1700	0.0034	0.0682	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jun	62.65	54.94	70.36	51.98	0.0072	0.0055	0.0091	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0227	0.0166	0.0306	120.1900	0.0053	0.0241	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0028	0.0020	0.0039	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0065	0.0058	0.0062	132.5376	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0991	0.0755	0.1289	106.1700	0.0034	0.0685	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Jul	66.53	58.63	74.43	51.98	0.0081	0.0062	0.0103	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0264	0.0193	0.0357	120.1900	0.0053	0.0247	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0033	0.0023	0.0046	128.2000	0.0030	0.0018	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0074	0.0065	0.0071	132.5630	0.9858	0.9045	189.45	

Xylenes (mixed isomers)						0.1133	0.0861	0.1476	106.1700	0.0034	0.0689	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Aug	65.15	57.72	72.57	51.98	0.0078	0.0060	0.0098	130.0000			188.00	Option 1: VP60 = .0065 VP70 = .009
1,2,4-Trimethylbenzene						0.0250	0.0186	0.0333	120.1900	0.0053	0.0245	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0003	0.0002	0.0004	154.2000	0.0026	0.0001	154.20	Option 1: VP60 = .000192 VP70 = .000331
Naphthalene						0.0031	0.0022	0.0043	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0071	0.0063	0.0068	132.5495	0.9858	0.9050	189.45	
Xylenes (mixed isomers)						0.1081	0.0834	0.1388	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Sep	59.98	52.93	67.04	51.98	0.0065	0.0051	0.0083	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0204	0.0153	0.0270	120.1900	0.0053	0.0239	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0002	0.0001	0.0003	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0025	0.0018	0.0034	128.2000	0.0030	0.0017	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0059	0.0053	0.0057	132.5455	0.9858	0.9056	189.45	
Xylenes (mixed isomers)						0.0903	0.0702	0.1153	106.1700	0.0034	0.0688	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Oct	54.07	48.01	60.13	51.98	0.0053	0.0042	0.0065	130.0000			188.00	Option 1: VP50 = .0045 VP60 = .0065
1,2,4-Trimethylbenzene						0.0161	0.0125	0.0205	120.1900	0.0053	0.0230	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0002	154.2000	0.0026	0.0001	154.20	Option 1: VP50 = .000108 VP60 = .000192
Naphthalene						0.0019	0.0014	0.0025	128.2000	0.0030	0.0016	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0048	0.0043	0.0047	132.5065	0.9858	0.9073	189.45	
Xylenes (mixed isomers)						0.0732	0.0586	0.0908	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Nov	48.04	43.61	52.46	51.98	0.0042	0.0036	0.0050	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0125	0.0103	0.0150	120.1900	0.0053	0.0224	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0014	0.0012	0.0018	128.2000	0.0030	0.0015	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0038	0.0035	0.0038	132.5176	0.9858	0.9074	189.45	
Xylenes (mixed isomers)						0.0586	0.0496	0.0690	106.1700	0.0034	0.0686	106.17	Option 2: A=7.009, B=1462.266, C=215.11
Distillate fuel oil no. 2	Dec	42.89	39.34	46.44	51.98	0.0035	0.0031	0.0040	130.0000			188.00	Option 1: VP40 = .0031 VP50 = .0045
1,2,4-Trimethylbenzene						0.0100	0.0085	0.0116	120.1900	0.0053	0.0217	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	0.0001	0.0001	154.2000	0.0026	0.0001	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	0.0009	0.0013	128.2000	0.0030	0.0014	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						0.0032	0.0029	0.0031	132.4876	0.9858	0.9087	189.45	
Xylenes (mixed isomers)						0.0483	0.0421	0.0552	106.1700	0.0034	0.0681	106.17	Option 2: A=7.009, B=1462.266, C=215.11



## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 213 - Vertical Fixed Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Standing Losses (lb):	15.5840	18.6153	27.1567	35.7598	49.0882	59.1433	69.9966	63.3520	49.5869	36.8526	21.2247	14.8928
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Tank Vapor Space Volume:												
Vapor Space Volume (cu ft):	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760	201,407.9760
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Tank Shell Height (ft):	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000	29.5000
Average Liquid Height (ft):	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000	12.0000
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Outage (Cone Roof)												
Roof Outage (ft):	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333	1.2333
Roof Height (ft):	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000	3.7000
Roof Slope (ft/ft):	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600
Shell Radius (ft):	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000	58.5000
Vapor Density												
Vapor Density (lb/cu ft):	0.0001	0.0001	0.0001	0.0001	0.0001	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Daily Avg. Liquid Surface Temp. (deg. R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Average Ambient Temp. (deg. F):	27.8500	34.1000	41.8000	49.6000	58.7500	69.1000	77.9500	75.6000	65.1000	53.1500	40.8500	29.7000
Ideal Gas Constant R (psia cu ft / (lb-mol-deg R)):	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731	10.731
Liquid Bulk Temperature (deg. R):	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525	511.6525
Tank Paint Solar Absorptance (Shell):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Tank Paint Solar Absorptance (Roof):	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700	0.1700
Daily Total Solar Insulation Factor (Btu/sqft day):	617.0902	922.6212	1,303.0279	1,713.2580	2,067.0141	2,335.4245	2,325.5891	2,064.7932	1,660.5912	1,172.9472	710.0503	533.0136
Vapor Space Expansion Factor												
Vapor Space Expansion Factor:	0.0305	0.0359	0.0418	0.0489	0.0559	0.0593	0.0604	0.0569	0.0545	0.0473	0.0350	0.0283
Daily Vapor Temperature Range (deg. R):	15.2493	18.0717	21.1784	25.0031	28.7750	30.8446	31.5898	29.7004	28.2084	24.2312	17.7078	14.2011
Daily Vapor Pressure Range (psia):	0.0008	0.0013	0.0018	0.0023	0.0031	0.0036	0.0041	0.0037	0.0032	0.0023	0.0014	0.0009
Breather Vent Press. Setting Range(psia):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Vapor Pressure at Daily Minimum Liquid Surface Temperature (psia):	0.0031	0.0032	0.0037	0.0041	0.0046	0.0055	0.0062	0.0060	0.0051	0.0042	0.0036	0.0031
Vapor Pressure at Daily Maximum Liquid Surface Temperature (psia):	0.0039	0.0045	0.0054	0.0064	0.0077	0.0091	0.0103	0.0098	0.0083	0.0065	0.0050	0.0040
Daily Avg. Liquid Surface Temp. (deg R):	501.8630	505.0233	508.9222	512.9051	517.4062	522.3207	526.2015	524.8172	519.6544	513.7415	507.7078	502.5640
Daily Min. Liquid Surface Temp. (deg R):	498.0506	500.5054	503.6276	506.6543	510.2125	514.6095	518.3040	517.3921	512.6023	507.6837	503.2808	499.0138
Daily Max. Liquid Surface Temp. (deg R):	505.6753	509.5412	514.2168	519.1559	524.5999	530.0318	534.0989	532.2423	526.7065	519.7993	512.1348	506.1143
Daily Ambient Temp. Range (deg. R):	17.1000	19.0000	20.8000	23.4000	26.3000	27.4000	28.5000	27.6000	28.2000	25.9000	19.9000	16.2000
Vented Vapor Saturation Factor												
Vented Vapor Saturation Factor:	0.9966	0.9962	0.9957	0.9949	0.9940	0.9929	0.9920	0.9923	0.9936	0.9948	0.9958	0.9965
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035

Vapor Space Outage (ft):	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333	18.7333
Working Losses (lb):	81.5208	92.1074	105.1680	123.1546	144.6945	171.3837	194.5980	186.3177	155.4530	127.1570	101.1001	83.8693
Vapor Molecular Weight (lb/lb-mole):	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000	130.0000
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	0.0034	0.0038	0.0044	0.0051	0.0060	0.0072	0.0081	0.0078	0.0065	0.0053	0.0042	0.0035
Net Throughput (gal/mo.):	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300	10,712,263.3300
Annual Turnovers:	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568	54.0568
Turnover Factor:	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216	0.7216
Maximum Liquid Volume (gal):	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000	2,378,000.0000
Maximum Liquid Height (ft):	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000	27.0000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Working Loss Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	97.1048	110.7227	132.3247	158.9144	193.7827	230.5270	264.5947	249.6696	205.0399	164.0096	122.3248	98.7622

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**213 - Vertical Fixed Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Distillate fuel oil no. 2	1,566.52	461.25	2,027.78
1,2,4-Trimethylbenzene	36.62	10.87	47.49
Biphenyl	0.16	0.05	0.21
Naphthalene	2.50	0.75	3.25
Unidentified Components	1,419.96	417.98	1,837.94
Xylenes (mixed isomers)	107.28	31.60	138.88

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	242 Projected
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR85WIN / HCN

**Tank Dimensions**

Diameter (ft):	117.00
Volume (gallons):	2,334,000.00
Turnovers:	68.30

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Unslotted Guide-Pole Well/Ungasketed Sliding Cover	1
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	19
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format

## Liquid Contents of Storage Tank

242 Projected - External Floating Roof Tank  
Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
HCN	Jan	42.19	38.38	46.01	51.98	2.3936	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0057	0.0026	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0062	0.0049	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.0356	0.0044	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8349	N/A	N/A	68.7547	0.8456	0.9846	111.49	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0641	0.0020	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Feb	45.35	40.84	49.87	51.98	2.5635	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0057	0.0027	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0062	0.0050	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0356	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.0350	N/A	N/A	68.7458	0.8456	0.9841	111.49	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0641	0.0021	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Mar	49.25	43.96	54.55	51.98	2.7866	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0057	0.0028	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0062	0.0051	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0356	0.0048	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2975	N/A	N/A	68.7345	0.8456	0.9835	111.49	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0641	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Apr	53.24	46.98	59.49	51.98	3.0306	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0057	0.0029	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0062	0.0052	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.0356	0.0050	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.5845	N/A	N/A	68.7228	0.8456	0.9828	111.49	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0641	0.0024	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	May	57.74	50.54	64.93	51.98	3.3270	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3

1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0057	0.0030	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0062	0.0054	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0356	0.0052	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.9327	N/A	N/A	68.7092	0.8456	0.9821	111.49	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0641	0.0026	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Jun	62.65	54.94	70.36	51.98	3.6770	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0057	0.0031	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0062	0.0055	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0356	0.0055	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3437	N/A	N/A	68.6940	0.8456	0.9813	111.49	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0641	0.0028	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Jul	66.53	58.63	74.43	51.98	3.9739	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0057	0.0032	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0062	0.0057	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.0356	0.0058	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6922	N/A	N/A	68.6817	0.8456	0.9806	111.49	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0641	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0263	0.0003	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0057	0.0032	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0108	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0062	0.0056	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.0356	0.0057	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.5654	N/A	N/A	68.6861	0.8456	0.9808	111.49	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0641	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Sep	59.98	52.93	67.04	51.98	3.4836	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0057	0.0030	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0062	0.0055	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.0356	0.0054	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1167	N/A	N/A	68.7023	0.8456	0.9817	111.49	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0641	0.0026	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Oct	54.07	48.01	60.13	51.98	3.0840	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0057	0.0029	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0012	0.0007	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0108	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0062	0.0053	86.17	Option 2: A=6.876, B=1171.17, C=224.41

Naphthalene						0.0019	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.0356	0.0050	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.6472	N/A	N/A	68.7203	0.8456	0.9827	111.49	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0641	0.0024	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Nov	48.04	43.61	52.46	51.98	2.7155	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0057	0.0028	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0062	0.0051	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.0356	0.0047	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2138	N/A	N/A	68.7381	0.8456	0.9837	111.49	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0641	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
HCN	Dec	42.89	39.34	46.44	51.98	2.4305	N/A	N/A	69.0000			110.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0263	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0011	0.0003	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0057	0.0027	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0012	0.0006	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0108	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0062	0.0049	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0034	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.0356	0.0044	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8783	N/A	N/A	68.7527	0.8456	0.9845	111.49	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0641	0.0020	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 242 Projected - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	126.9531	146.1812	180.6565	204.3106	223.4703	251.3637	278.3910	274.1986	229.3328	187.7915	154.3337	130.5641
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.0524	0.0566	0.0622	0.0684	0.0762	0.0857	0.0940	0.0910	0.0804	0.0698	0.0604	0.0533
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.3936	2.5635	2.7866	3.0306	3.3270	3.6770	3.9739	3.8659	3.4836	3.0840	2.7155	2.4305
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714	24.4714
Net Throughput (gal/mo.):	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000	13,283,445.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	520.4484	620.3145	815.4736	935.4023	1,013.5589	1,140.0705	1,268.6293	1,261.1857	1,025.1952	814.2746	651.2738	538.4415
Value of Vapor Pressure Function:	0.0524	0.0566	0.0622	0.0684	0.0762	0.0857	0.0940	0.0910	0.0804	0.0698	0.0604	0.0533
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,726.7231	1,906.5032	2,281.5283	2,378.3532	2,313.6707	2,313.6707	2,345.9460	2,410.8916	2,217.6452	2,029.2750	1,876.1705	1,756.3133
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	671.8728	790.9671	1,020.6016	1,164.1843	1,261.5006	1,415.9056	1,571.4917	1,559.8556	1,278.9994	1,026.5375	830.0789	693.4770

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> n))		
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	7.8327
Automatic Gauge Float Well/Unbolted Cover, Ungasketed	1	14.00	5.40	1.10	267.2850
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	63.2691
Unslotted Guide-Pole Well/Ungasketed Sliding Cover	1	31.00	150.00	1.40	9,736.5074
Gauge-Hatch/Sample Well (8-in. Diam.)/Weighted Mech. Actuation, Gask.	1	0.47	0.02	0.97	2.8806
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	19	2.00	0.37	0.91	368.5295
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24	0.82	0.53	0.14	176.8005



**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**242 Projected - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
HCN	2,387.55	293.66	10,604.27	0.00	13,285.47
1,2,4-Trimethylbenzene	0.55	7.73	2.44	0.00	10.72
2,2,4-Trimethylpentane (isooctane)	0.70	0.33	3.11	0.00	4.13
Benzene	7.06	1.67	31.41	0.00	40.14
Cyclohexane	1.58	0.36	7.05	0.00	8.99
Ethylbenzene	1.21	3.16	5.38	0.00	9.75
Hexane (-n)	12.72	1.83	56.58	0.00	71.14
Naphthalene	0.01	1.00	0.04	0.00	1.04
Toluene	12.30	10.45	54.79	0.00	77.54
Unidentified Components	2,345.43	248.32	10,416.80	0.00	13,010.56
Xylenes (mixed isomers)	5.98	18.81	26.67	0.00	51.46

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	243
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR85

**Tank Dimensions**

Diameter (ft):	117.00
Volume (gallons):	2,334,000.00
Turnovers:	39.45

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Drain (3-in. Diameter)/Open	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	12
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format

## Liquid Contents of Storage Tank

### 243 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
RUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0201	0.0042	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0429	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1850	N/A	N/A	92.1300	0.0554	0.0031	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.8953	N/A	N/A	61.5096	0.8187	0.9726	92.00	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 13.0)	Feb	45.35	40.84	49.87	51.98	5.2428	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0201	0.0044	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0140	0.0032	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0429	0.0156	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2058	N/A	N/A	92.1300	0.0554	0.0032	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.2741	N/A	N/A	61.4939	0.8187	0.9718	92.00	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.5)	Mar	49.25	43.96	54.55	51.98	4.4323	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0120	0.0016	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0201	0.0054	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0140	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0429	0.0194	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2342	N/A	N/A	92.1300	0.0554	0.0041	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2686	N/A	N/A	65.4349	0.8187	0.9649	92.00	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.0)	Apr	53.24	46.98	59.49	51.98	3.5258	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0120	0.0023	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0201	0.0074	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0140	0.0054	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0429	0.0263	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2665	N/A	N/A	92.1300	0.0554	0.0057	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1440	N/A	N/A	67.2730	0.8187	0.9520	92.00	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	May	57.74	50.54	64.93	51.98	3.3270	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0120	0.0027	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0201	0.0090	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0140	0.0065	84.16	Option 2: A=6.841, B=1201.53, C=222.65

Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0429	0.0314	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3076	N/A	N/A	92.1300	0.0554	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8795	N/A	N/A	67.1184	0.8187	0.9423	92.00	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0279	0.0009	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Jun	62.65	54.94	70.36	51.98	3.6770	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0120	0.0028	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0201	0.0093	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0140	0.0067	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0429	0.0323	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3584	N/A	N/A	92.1300	0.0554	0.0073	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.2806	N/A	N/A	67.0850	0.8187	0.9403	92.00	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0279	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Jul	66.53	58.63	74.43	51.98	3.9739	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0120	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0201	0.0096	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0140	0.0069	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0429	0.0330	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4034	N/A	N/A	92.1300	0.0554	0.0076	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6203	N/A	N/A	67.0584	0.8187	0.9387	92.00	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0279	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0120	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0201	0.0095	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0140	0.0068	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0429	0.0328	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3868	N/A	N/A	92.1300	0.0554	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.4967	N/A	N/A	67.0679	0.8187	0.9393	92.00	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0279	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.0)	Sep	59.98	52.93	67.04	51.98	4.0426	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0120	0.0024	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0201	0.0079	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0140	0.0057	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0429	0.0274	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3300	N/A	N/A	92.1300	0.0554	0.0061	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.7419	N/A	N/A	67.2323	0.8187	0.9495	92.00	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.0)	Oct	54.07	48.01	60.13	51.98	4.6164	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0120	0.0018	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0201	0.0060	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0140	0.0043	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0429	0.0212	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2738	N/A	N/A	92.1300	0.0554	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4723	N/A	N/A	65.3754	0.8187	0.9613	92.00	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0279	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 11.5)	Nov	48.04	43.61	52.46	51.98	4.8014	N/A	N/A	65.0000			92.00	Option 4: RVP=11.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0120	0.0015	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0201	0.0049	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0140	0.0036	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21

Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0429	0.0176	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2250	N/A	N/A	92.1300	0.0554	0.0037	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.7245	N/A	N/A	64.4735	0.8187	0.9682	92.00	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 13.0)	Dec	42.89	39.34	46.44	51.98	4.9928	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0201	0.0043	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0429	0.0153	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1895	N/A	N/A	92.1300	0.0554	0.0031	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9777	N/A	N/A	61.5061	0.8187	0.9724	92.00	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 243 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	267.0119	308.9418	298.8098	240.0463	220.2316	247.7207	274.3564	270.2247	269.9180	291.0879	286.1949	274.8772
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.1227	0.1331	0.1075	0.0815	0.0762	0.0857	0.0940	0.0910	0.0960	0.1131	0.1188	0.1249
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	5.2428	4.4323	3.5258	3.3270	3.6770	3.9739	3.8659	4.0426	4.6164	4.8014	4.9928
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	734.7477	912.9651	1,006.7782	833.9417	749.7072	843.2850	943.5411	948.2493	890.6446	900.1030	835.9878	765.6537
Value of Vapor Pressure Function:	0.1227	0.1331	0.1075	0.0815	0.0762	0.0857	0.0940	0.0910	0.0960	0.1131	0.1188	0.1249
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,159.0336	1,327.6836	1,702.9763	1,804.7189	1,736.5384	1,736.5384	1,770.4526	1,839.3373	1,636.9082	1,447.1511	1,298.6962	1,186.2629
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,014.0002	1,234.1475	1,317.8287	1,086.2287	982.1795	1,103.2464	1,230.1382	1,230.7147	1,172.8033	1,203.4316	1,134.4233	1,052.7716

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> ))		
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	86.6870
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	10.8611
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	258.4421
Roof Drain (3-in. Diameter)/Open	1	1.50	0.21	1.70	41.2073
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	24	0.82	0.53	0.14	244.7672
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	12	2.00	0.37	0.91	319.2037
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	8.9634
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	9,392.3114

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**243 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
RUL Gasoline (RVP 10.0)	291.09	12.24	900.10	0.00	1,203.43
1,2,4-Trimethylbenzene	0.01	0.05	0.02	0.00	0.07
2,2,4-Trimethylpentane (isooctane)	0.53	0.15	1.63	0.00	2.31
Benzene	1.75	0.25	5.40	0.00	7.39
Cyclohexane	1.26	0.17	3.91	0.00	5.35
Ethylbenzene	0.04	0.06	0.12	0.00	0.22
Hexane (-n)	6.17	0.52	19.07	0.00	25.76
Toluene	1.33	0.68	4.12	0.00	6.14
Unidentified Components	279.82	10.02	865.28	0.00	1,155.12
Xylenes (mixed isomers)	0.18	0.34	0.56	0.00	1.08
RUL Gasoline (RVP 10.5)	298.81	12.24	1,006.78	0.00	1,317.83
1,2,4-Trimethylbenzene	0.00	0.05	0.02	0.00	0.07
2,2,4-Trimethylpentane (isooctane)	0.49	0.15	1.65	0.00	2.28
Benzene	1.62	0.25	5.47	0.00	7.35
Cyclohexane	1.18	0.17	3.98	0.00	5.33
Ethylbenzene	0.03	0.06	0.12	0.00	0.21
Hexane (-n)	5.79	0.52	19.50	0.00	25.81
Toluene	1.22	0.68	4.11	0.00	6.01
Unidentified Components	288.31	10.02	971.40	0.00	1,269.73
Xylenes (mixed isomers)	0.16	0.34	0.54	0.00	1.05
RUL Gasoline (RVP 11.5)	286.19	12.24	835.99	0.00	1,134.42
1,2,4-Trimethylbenzene	0.00	0.05	0.01	0.00	0.07
2,2,4-Trimethylpentane (isooctane)	0.42	0.15	1.24	0.00	1.81
Benzene	1.41	0.25	4.11	0.00	5.77

Cyclohexane	1.02	0.17	2.99	0.00	4.19
Ethylbenzene	0.03	0.06	0.09	0.00	0.18
Hexane (-n)	5.02	0.52	14.68	0.00	20.23
Toluene	1.05	0.68	3.07	0.00	4.80
Unidentified Components	277.09	10.02	809.40	0.00	1,096.51
Xylenes (mixed isomers)	0.14	0.34	0.40	0.00	0.88
RUL Gasoline (RVP 13.0)	850.83	36.72	2,413.37	0.00	3,300.92
1,2,4-Trimethylbenzene	0.01	0.15	0.03	0.00	0.19
2,2,4-Trimethylpentane (isooctane)	1.09	0.44	3.09	0.00	4.62
Benzene	3.65	0.74	10.35	0.00	14.73
Cyclohexane	2.66	0.51	7.55	0.00	10.72
Ethylbenzene	0.07	0.18	0.21	0.00	0.47
Hexane (-n)	13.12	1.57	37.23	0.00	51.93
Toluene	2.68	2.04	7.61	0.00	12.33
Unidentified Components	827.20	30.07	2,346.32	0.00	3,203.58
Xylenes (mixed isomers)	0.35	1.03	0.98	0.00	2.35
RUL Gasoline (RVP 7.0)	1,012.53	48.96	3,484.78	0.00	4,546.28
1,2,4-Trimethylbenzene	0.03	0.20	0.12	0.00	0.35
2,2,4-Trimethylpentane (isooctane)	2.89	0.59	9.94	0.00	13.42
Benzene	9.45	0.98	32.54	0.00	42.97
Cyclohexane	6.81	0.68	23.42	0.00	30.91
Ethylbenzene	0.22	0.24	0.76	0.00	1.23
Hexane (-n)	32.84	2.10	113.05	0.00	148.00
Toluene	7.45	2.71	25.66	0.00	35.83
Unidentified Components	951.79	40.09	3,275.69	0.00	4,267.57
Xylenes (mixed isomers)	1.04	1.37	3.59	0.00	6.00
RUL Gasoline (RVP 8.0)	509.96	24.48	1,724.59	0.00	2,259.03
1,2,4-Trimethylbenzene	0.01	0.10	0.04	0.00	0.16
2,2,4-Trimethylpentane (isooctane)	1.19	0.29	4.01	0.00	5.49
Benzene	3.91	0.49	13.20	0.00	17.60
Cyclohexane	2.82	0.34	9.54	0.00	12.71
Ethylbenzene	0.09	0.12	0.30	0.00	0.50
Hexane (-n)	13.73	1.05	46.39	0.00	61.17
Toluene	3.01	1.36	10.18	0.00	14.55
Unidentified Components	484.80	20.04	1,639.54	0.00	2,144.38
Xylenes (mixed isomers)	0.41	0.68	1.39	0.00	2.48



**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	252
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR85IDA

**Tank Dimensions**

Diameter (ft):	117.00
Volume (gallons):	2,334,000.00
Turnovers:	39.04

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	18
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	21

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**

## Liquid Contents of Storage Tank

### 252 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
RUL Gasoline (RVP 12.5)	Jan	42.19	38.38	46.01	51.98	4.7034	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0201	0.0043	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0429	0.0155	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1850	N/A	N/A	92.1300	0.0554	0.0031	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.6267	N/A	N/A	63.5282	0.8187	0.9722	92.00	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.5)	Feb	45.35	40.84	49.87	51.98	4.0960	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0120	0.0016	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0201	0.0052	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0140	0.0038	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0429	0.0188	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2058	N/A	N/A	92.1300	0.0554	0.0039	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.8734	N/A	N/A	65.4549	0.8187	0.9660	92.00	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 9.0)	Mar	49.25	43.96	54.55	51.98	3.7154	N/A	N/A	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0120	0.0019	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0201	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0140	0.0046	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0429	0.0228	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2342	N/A	N/A	92.1300	0.0554	0.0048	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3930	N/A	N/A	66.3553	0.8187	0.9587	92.00	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0279	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.5)	Apr	53.24	46.98	59.49	51.98	3.7765	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0120	0.0021	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0201	0.0069	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0140	0.0050	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0429	0.0246	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2665	N/A	N/A	92.1300	0.0554	0.0053	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.4503	N/A	N/A	67.3231	0.8187	0.9552	92.00	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0279	0.0007	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.5)	May	57.74	50.54	64.93	51.98	4.1357	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0120	0.0022	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0201	0.0072	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0140	0.0052	84.16	Option 2: A=6.841, B=1201.53, C=222.65

Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0429	0.0253	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3076	N/A	N/A	92.1300	0.0554	0.0056	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.8674	N/A	N/A	67.2973	0.8187	0.9536	92.00	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Jun	62.65	54.94	70.36	51.98	3.6770	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0120	0.0028	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0201	0.0093	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0140	0.0067	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0429	0.0323	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3584	N/A	N/A	92.1300	0.0554	0.0073	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.2806	N/A	N/A	67.0850	0.8187	0.9403	92.00	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0279	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.0)	Jul	66.53	58.63	74.43	51.98	4.6008	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0120	0.0025	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0201	0.0083	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0140	0.0059	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0429	0.0285	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4034	N/A	N/A	92.1300	0.0554	0.0066	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3860	N/A	N/A	67.1923	0.8187	0.9470	92.00	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0279	0.0009	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0120	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0201	0.0095	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0140	0.0068	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0429	0.0328	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3868	N/A	N/A	92.1300	0.0554	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.4967	N/A	N/A	67.0679	0.8187	0.9393	92.00	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0279	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.5)	Sep	59.98	52.93	67.04	51.98	4.3252	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0120	0.0022	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0201	0.0073	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0140	0.0053	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0429	0.0256	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3300	N/A	N/A	92.1300	0.0554	0.0057	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0871	N/A	N/A	67.2844	0.8187	0.9528	92.00	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.0)	Oct	54.07	48.01	60.13	51.98	4.6164	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0120	0.0018	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0201	0.0060	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0140	0.0043	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0429	0.0212	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2738	N/A	N/A	92.1300	0.0554	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4723	N/A	N/A	65.3754	0.8187	0.9613	92.00	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0279	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 12.0)	Nov	48.04	43.61	52.46	51.98	5.0418	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0120	0.0014	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0201	0.0048	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0140	0.0035	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21

Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0429	0.0170	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2250	N/A	N/A	92.1300	0.0554	0.0036	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.0182	N/A	N/A	63.4759	0.8187	0.9692	92.00	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 12.5)	Dec	42.89	39.34	46.44	51.98	4.7701	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0201	0.0043	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0429	0.0156	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1895	N/A	N/A	92.1300	0.0554	0.0032	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.7058	N/A	N/A	63.5249	0.8187	0.9720	92.00	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# **TANKS 4.0.9d** **Emissions Report - Detail Format** **Detail Calculations (AP-42)**

## **252 - External Floating Roof Tank** **Salt Lake City, Utah**

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	260.0786	241.0761	244.8446	260.4199	285.3506	247.7207	328.5043	270.2247	293.1610	291.0879	299.9713	267.6991
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.1158	0.0976	0.0868	0.0885	0.0987	0.0857	0.1126	0.0910	0.1043	0.1131	0.1265	0.1179
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.7034	4.0960	3.7154	3.7765	4.1357	3.6770	4.6008	3.8659	4.3252	4.6164	5.0418	4.7701
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Vapor Molecular Weight (lb/lb-mole):	64.0000	66.0000	67.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407	12.2407
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000	117.0000
Roof Fitting Losses (lb):	415.2859	412.3196	477.5163	524.1259	562.4160	488.2488	654.2964	549.5255	559.7081	520.6204	507.2755	432.4319
Value of Vapor Pressure Function:	0.1158	0.0976	0.0868	0.0885	0.0987	0.0857	0.1126	0.0910	0.1043	0.1131	0.1265	0.1179
Vapor Molecular Weight (lb/lb-mole):	64.0000	66.0000	67.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	672.5598	768.4167	985.7510	1,045.5151	1,005.4285	1,005.4285	1,025.3497	1,065.9251	947.1245	837.0335	751.8542	687.9517
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	687.6053	665.6364	734.6016	796.7865	860.0073	748.2102	995.0414	831.9909	865.1098	823.9490	819.4875	712.3717
Roof Fitting/Status	Quantity		KF <sub>a</sub> (lb-mole/yr)		Roof Fitting Loss Factors KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))		m		Losses(lb)			
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1		1.60		0.00		0.00		10.9746			
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1		0.71		0.10		1.00		9.0756			
Unslotted Guide-Pole Well/Gasketed Sliding Cover	1		25.00		13.00		2.20		5,041.2029			
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1		6.20		1.20		0.94		87.7802			
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1		4.30		17.00		0.38		261.5331			
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	18		2.00		0.37		0.91		484.7625			
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	21		0.82		0.53		0.14		216.4704			

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**252 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
RUL Gasoline (RVP 10.0)	291.09	12.24	520.62	0.00	823.95
1,2,4-Trimethylbenzene	0.01	0.05	0.01	0.00	0.06
2,2,4-Trimethylpentane (isooctane)	0.53	0.15	0.94	0.00	1.62
Benzene	1.75	0.25	3.12	0.00	5.12
Cyclohexane	1.26	0.17	2.26	0.00	3.70
Ethylbenzene	0.04	0.06	0.07	0.00	0.17
Hexane (-n)	6.17	0.52	11.03	0.00	17.72
Toluene	1.33	0.68	2.39	0.00	4.40
Unidentified Components	279.82	10.02	500.48	0.00	790.32
Xylenes (mixed isomers)	0.18	0.34	0.32	0.00	0.84
RUL Gasoline (RVP 10.5)	241.08	12.24	412.32	0.00	665.64
1,2,4-Trimethylbenzene	0.00	0.05	0.01	0.00	0.06
2,2,4-Trimethylpentane (isooctane)	0.38	0.15	0.65	0.00	1.17
Benzene	1.26	0.25	2.16	0.00	3.67
Cyclohexane	0.92	0.17	1.58	0.00	2.67
Ethylbenzene	0.03	0.06	0.04	0.00	0.13
Hexane (-n)	4.54	0.52	7.76	0.00	12.82
Toluene	0.94	0.68	1.60	0.00	3.22
Unidentified Components	232.89	10.02	398.32	0.00	641.23
Xylenes (mixed isomers)	0.12	0.34	0.21	0.00	0.67
RUL Gasoline (RVP 12.0)	299.97	12.24	507.28	0.00	819.49
1,2,4-Trimethylbenzene	0.00	0.05	0.01	0.00	0.06
2,2,4-Trimethylpentane (isooctane)	0.43	0.15	0.73	0.00	1.30
Benzene	1.43	0.25	2.41	0.00	4.09

Cyclohexane	1.04	0.17	1.76	0.00	2.96
Ethylbenzene	0.03	0.06	0.05	0.00	0.14
Hexane (-n)	5.09	0.52	8.61	0.00	14.23
Toluene	1.07	0.68	1.80	0.00	3.55
Unidentified Components	290.74	10.02	491.67	0.00	792.43
Xylenes (mixed isomers)	0.14	0.34	0.24	0.00	0.72
RUL Gasoline (RVP 12.5)	527.78	24.48	847.72	0.00	1,399.98
1,2,4-Trimethylbenzene	0.01	0.10	0.01	0.00	0.11
2,2,4-Trimethylpentane (isooctane)	0.68	0.29	1.09	0.00	2.06
Benzene	2.27	0.49	3.65	0.00	6.41
Cyclohexane	1.66	0.34	2.66	0.00	4.66
Ethylbenzene	0.05	0.12	0.07	0.00	0.24
Hexane (-n)	8.18	1.05	13.15	0.00	22.38
Toluene	1.66	1.36	2.67	0.00	5.69
Unidentified Components	513.06	20.04	824.08	0.00	1,357.18
Xylenes (mixed isomers)	0.21	0.68	0.34	0.00	1.24
RUL Gasoline (RVP 7.0)	517.95	24.48	1,037.77	0.00	1,580.20
1,2,4-Trimethylbenzene	0.02	0.10	0.04	0.00	0.15
2,2,4-Trimethylpentane (isooctane)	1.49	0.29	2.98	0.00	4.76
Benzene	4.86	0.49	9.74	0.00	15.09
Cyclohexane	3.50	0.34	7.01	0.00	10.84
Ethylbenzene	0.11	0.12	0.23	0.00	0.46
Hexane (-n)	16.86	1.05	33.79	0.00	51.70
Toluene	3.84	1.36	7.69	0.00	12.89
Unidentified Components	486.74	20.04	975.23	0.00	1,482.01
Xylenes (mixed isomers)	0.54	0.68	1.08	0.00	2.30
RUL Gasoline (RVP 8.0)	328.50	12.24	654.30	0.00	995.04
1,2,4-Trimethylbenzene	0.01	0.05	0.02	0.00	0.08
2,2,4-Trimethylpentane (isooctane)	0.83	0.15	1.66	0.00	2.63
Benzene	2.71	0.25	5.40	0.00	8.36
Cyclohexane	1.95	0.17	3.88	0.00	6.00
Ethylbenzene	0.06	0.06	0.13	0.00	0.25
Hexane (-n)	9.37	0.52	18.66	0.00	28.55
Toluene	2.16	0.68	4.30	0.00	7.14
Unidentified Components	311.11	10.02	619.64	0.00	940.77
Xylenes (mixed isomers)	0.31	0.34	0.61	0.00	1.26
RUL Gasoline (RVP 8.5)	838.93	36.72	1,646.25	0.00	2,521.90

	0.02	0.15	0.04	0.00	0.21
2,2,4-Trimethylpentane (isooctane)	1.83	0.44	3.58	0.00	5.85
Benzene	6.02	0.74	11.81	0.00	18.56
Cyclohexane	4.35	0.51	8.53	0.00	13.40
Ethylbenzene	0.14	0.18	0.26	0.00	0.58
Hexane (-n)	21.14	1.57	41.46	0.00	64.17
Toluene	4.65	2.04	9.11	0.00	15.80
Unidentified Components	800.16	30.07	1,570.21	0.00	2,400.44
Xylenes (mixed isomers)	0.63	1.03	1.24	0.00	2.90
RUL Gasoline (RVP 9.0)	244.84	12.24	477.52	0.00	734.60
1,2,4-Trimethylbenzene	0.00	0.05	0.01	0.00	0.06
2,2,4-Trimethylpentane (isooctane)	0.47	0.15	0.92	0.00	1.54
Benzene	1.56	0.25	3.05	0.00	4.86
Cyclohexane	1.14	0.17	2.22	0.00	3.53
Ethylbenzene	0.03	0.06	0.06	0.00	0.16
Hexane (-n)	5.57	0.52	10.87	0.00	16.96
Toluene	1.17	0.68	2.29	0.00	4.14
Unidentified Components	234.73	10.02	457.80	0.00	702.55
Xylenes (mixed isomers)	0.15	0.34	0.30	0.00	0.80



## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	321
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Alkylation Feed

**Tank Dimensions**

Diameter (ft):		60.00
Volume (gallons):		1,008,000.00
Turnovers:		56.73
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		2.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal:	None

**Deck Characteristics**

Deck Fitting Category:	Detail
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Leg or Hanger Well/Adjustable	20
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	28
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# **TANKS 4.0.9d** **Emissions Report - Detail Format** **Liquid Contents of Storage Tank**

## **321 - Internal Floating Roof Tank** **Salt Lake City, Utah**

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Pentane (-n)	Jan	42.19	38.38	46.01	51.98	4.5397	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Feb	45.35	40.84	49.87	51.98	4.8921	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Mar	49.25	43.96	54.55	51.98	5.3578	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Apr	53.24	46.98	59.49	51.98	5.8709	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	May	57.74	50.54	64.93	51.98	6.4992	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Jun	62.65	54.94	70.36	51.98	7.2477	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Jul	66.53	58.63	74.43	51.98	7.8879	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Aug	65.15	57.72	72.57	51.98	7.6544	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Sep	59.98	52.93	67.04	51.98	6.8333	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Oct	54.07	48.01	60.13	51.98	5.9837	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Nov	48.04	43.61	52.46	51.98	5.2089	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558
Pentane (-n)	Dec	42.89	39.34	46.44	51.98	4.6160	N/A	N/A	72.1500			72.15	Option 3: A=27691, B=7.558

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Detail Calculations (AP-42)

### 321 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	231.7106	254.6461	286.5120	323.9005	373.4081	438.7895	501.5032	477.8078	401.6442	332.4673	276.1257	236.5952
Seal Factor A (lb-mole/ft-yr):	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000	5.8000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Value of Vapor Pressure Function:	0.1107	0.1217	0.1369	0.1548	0.1785	0.2097	0.2397	0.2284	0.1920	0.1589	0.1320	0.1131
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.5397	4.8921	5.3578	5.8709	6.4992	7.2477	7.8879	7.6544	6.8333	5.9837	5.2089	4.6160
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184	14.5184
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000	4,765,075.0000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530	5.2530
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Deck Fitting Losses (lb):	230.4455	253.2558	284.9477	322.1321	371.3694	436.3938	498.7651	475.1991	399.4513	330.6521	274.6181	235.3035
Value of Vapor Pressure Function:	0.1107	0.1217	0.1369	0.1548	0.1785	0.2097	0.2397	0.2284	0.1920	0.1589	0.1320	0.1131
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000	346.1000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000	60.0000
Vapor Molecular Weight (lb/lb-mole):	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500	72.1500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	476.6745	522.4204	585.9782	660.5511	759.2960	889.7017	1,014.7867	967.5254	815.6140	677.6378	565.2623	486.4171

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/yr mph <sup>n</sup> )		
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	73.7932
Roof Leg or Hanger Well/Adjustable	20	7.90	0.00	0.00	1,880.5361
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00	0.00	904.5617
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1	25.00	0.00	0.00	297.5532
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	51.1791
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00	0.00	142.8255
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	28	1.20	0.00	0.00	399.9115
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1	31.00	5.20	1.30	368.9660

## TANKS 4.0.9d

**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**321 - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Pentane (-n)	4,135.11	174.22	4,112.53	0.00	8,421.87

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	324
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR87PAS

**Tank Dimensions**

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	39.45

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Welded
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	2
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Roof Drain (3-in. Diameter)/90% Closed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**

## Liquid Contents of Storage Tank

### 324 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
MUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0398	0.0042	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0186	0.0039	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0095	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0266	0.0095	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.1233	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.1826	N/A	N/A	61.4399	0.6500	0.9718	88.97	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0922	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.5)	Feb	45.35	40.84	49.87	51.98	5.0105	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0398	0.0044	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0186	0.0041	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0266	0.0099	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.1233	0.0073	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2980	N/A	N/A	63.4343	0.6500	0.9704	88.97	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0922	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Mar	49.25	43.96	54.55	51.98	3.4801	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0398	0.0067	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0186	0.0062	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0095	0.0033	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0266	0.0149	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.1233	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0019	N/A	N/A	67.2097	0.6500	0.9549	88.97	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0922	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Apr	53.24	46.98	59.49	51.98	3.7765	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0398	0.0070	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0186	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0266	0.0153	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.1233	0.0118	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4209	N/A	N/A	67.1773	0.6500	0.9532	88.97	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0922	0.0023	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	May	57.74	50.54	64.93	51.98	4.1357	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3

1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0398	0.0073	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0186	0.0067	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0095	0.0035	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0266	0.0157	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.1233	0.0124	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9277	N/A	N/A	67.1399	0.6500	0.9513	88.97	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Jun	62.65	54.94	70.36	51.98	4.5589	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0398	0.0076	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0186	0.0069	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0095	0.0037	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0266	0.0162	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.1233	0.0131	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.5234	N/A	N/A	67.0982	0.6500	0.9491	88.97	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0922	0.0027	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Jul	66.53	58.63	74.43	51.98	4.9172	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0398	0.0079	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0186	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0095	0.0038	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0266	0.0166	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.1233	0.0137	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.0267	N/A	N/A	67.0647	0.6500	0.9474	88.97	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0922	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Aug	65.15	57.72	72.57	51.98	4.4779	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0398	0.0083	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0186	0.0076	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0095	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0266	0.0176	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.1233	0.0144	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.3841	N/A	N/A	67.0103	0.6500	0.9444	88.97	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0922	0.0030	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 9.0)	Sep	59.98	52.93	67.04	51.98	4.6097	N/A	N/A	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0398	0.0071	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0186	0.0065	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0266	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.1233	0.0121	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6178	N/A	N/A	66.1409	0.6500	0.9527	88.97	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 11.0)	Oct	54.07	48.01	60.13	51.98	5.1418	N/A	N/A	65.0000			92.00	Option 4: RVP=11, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0398	0.0055	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0186	0.0051	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0095	0.0027	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0266	0.0120	86.17	Option 2: A=6.876, B=1171.17, C=224.41

Naphthalene						0.0019	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.1233	0.0093	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.4470	N/A	N/A	64.3045	0.6500	0.9632	88.97	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0922	0.0019	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.5)	Nov	48.04	43.61	52.46	51.98	5.2837	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0398	0.0045	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0186	0.0042	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0266	0.0101	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.1233	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.6913	N/A	N/A	63.4170	0.6500	0.9696	88.97	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0922	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 13.0)	Dec	42.89	39.34	46.44	51.98	4.9928	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0398	0.0042	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0186	0.0039	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0095	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0266	0.0095	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.1233	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.2829	N/A	N/A	61.4354	0.6500	0.9716	88.97	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0922	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11



## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 324 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	261.3065	294.2752	225.0898	254.8554	279.2534	314.9362	349.7284	316.4448	305.9826	321.9147	312.0029	269.0037
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.7000	9.1000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Value of Vapor Pressure Function:	0.1227	0.1255	0.0803	0.0885	0.0987	0.1113	0.1225	0.1089	0.1129	0.1298	0.1345	0.1249
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	5.0105	3.4801	3.7765	4.1357	4.5589	4.9172	4.4779	4.6097	5.1418	5.2837	4.9928
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	706.4165	857.8223	752.8070	879.9864	944.0357	1,064.6639	1,194.9196	1,104.1084	1,001.3013	984.2074	898.4437	736.6682
Value of Vapor Pressure Function:	0.1227	0.1255	0.0803	0.0885	0.0987	0.1113	0.1225	0.1089	0.1129	0.1298	0.1345	0.1249
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,114.3423	1,281.6824	1,654.3109	1,755.3778	1,687.6482	1,687.6482	1,721.3372	1,789.7701	1,588.6911	1,400.2685	1,252.9143	1,141.3543
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	980.2309	1,164.6054	990.4047	1,147.3498	1,235.7970	1,392.1080	1,557.1559	1,433.0612	1,319.7918	1,318.6300	1,222.9545	1,018.1798

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> n))		
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	2	0.71	0.10	1.00	19.7277
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	95.4062
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	10,414.6251
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.9233
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	21.0927
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	284.2229
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5	2.00	0.37	0.91	146.3501
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12	0.82	0.53	0.14	134.3974

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**324 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
MUL Gasoline (RVP 11.0)	321.91	12.51	984.21	0.00	1,318.63
1,2,4-Trimethylbenzene	0.03	0.30	0.11	0.00	0.44
2,2,4-Trimethylpentane (isooctane)	1.77	0.50	5.40	0.00	7.67
Benzene	1.63	0.23	4.98	0.00	6.84
Cyclohexane	0.87	0.12	2.65	0.00	3.64
Ethylbenzene	0.11	0.18	0.35	0.00	0.65
Hexane (-n)	3.86	0.33	11.80	0.00	15.99
Naphthalene	0.00	0.01	0.00	0.00	0.01
Toluene	2.99	1.54	9.14	0.00	13.68
Unidentified Components	310.05	8.13	947.94	0.00	1,266.13
Xylenes (mixed isomers)	0.60	1.15	1.83	0.00	3.58
MUL Gasoline (RVP 12.5)	606.28	25.02	1,756.27	0.00	2,387.56
1,2,4-Trimethylbenzene	0.05	0.60	0.14	0.00	0.79
2,2,4-Trimethylpentane (isooctane)	2.71	1.00	7.84	0.00	11.54
Benzene	2.51	0.47	7.28	0.00	10.26
Cyclohexane	1.35	0.24	3.90	0.00	5.48
Ethylbenzene	0.17	0.37	0.49	0.00	1.02
Hexane (-n)	6.04	0.67	17.49	0.00	24.19
Naphthalene	0.00	0.03	0.00	0.00	0.03
Toluene	4.50	3.08	13.02	0.00	20.60
Unidentified Components	588.09	16.26	1,703.59	0.00	2,307.94
Xylenes (mixed isomers)	0.87	2.31	2.52	0.00	5.70
MUL Gasoline (RVP 13.0)	530.31	25.02	1,443.08	0.00	1,998.41
1,2,4-Trimethylbenzene	0.04	0.60	0.10	0.00	0.74

2,2,4-Trimethylpentane (isooctane)	2.23	1.00	6.06	0.00	9.29
Benzene	2.08	0.47	5.66	0.00	8.21
Cyclohexane	1.12	0.24	3.04	0.00	4.39
Ethylbenzene	0.13	0.37	0.37	0.00	0.87
Hexane (-n)	5.04	0.67	13.71	0.00	19.41
Naphthalene	0.00	0.03	0.00	0.00	0.03
Toluene	3.66	3.08	9.97	0.00	16.72
Unidentified Components	515.31	16.26	1,402.28	0.00	1,933.85
Xylenes (mixed isomers)	0.70	2.31	1.90	0.00	4.90
MUL Gasoline (RVP 8.0)	316.44	12.51	1,104.11	0.00	1,433.06
1,2,4-Trimethylbenzene	0.06	0.30	0.20	0.00	0.56
2,2,4-Trimethylpentane (isooctane)	2.63	0.50	9.16	0.00	12.28
Benzene	2.39	0.23	8.34	0.00	10.97
Cyclohexane	1.26	0.12	4.41	0.00	5.79
Ethylbenzene	0.18	0.18	0.64	0.00	1.00
Hexane (-n)	5.56	0.33	19.40	0.00	25.29
Naphthalene	0.00	0.01	0.00	0.00	0.02
Toluene	4.56	1.54	15.91	0.00	22.01
Unidentified Components	298.85	8.13	1,042.73	0.00	1,349.71
Xylenes (mixed isomers)	0.95	1.15	3.32	0.00	5.43
MUL Gasoline (RVP 8.5)	1,423.86	62.54	4,836.41	0.00	6,322.82
1,2,4-Trimethylbenzene	0.22	1.51	0.73	0.00	2.46
2,2,4-Trimethylpentane (isooctane)	10.45	2.49	35.51	0.00	48.45
Benzene	9.58	1.16	32.56	0.00	43.31
Cyclohexane	5.09	0.59	17.28	0.00	22.96
Ethylbenzene	0.70	0.92	2.38	0.00	4.01
Hexane (-n)	22.51	1.66	76.48	0.00	100.66
Naphthalene	0.00	0.07	0.00	0.00	0.08
Toluene	17.90	7.71	60.82	0.00	86.43
Unidentified Components	1,353.75	40.65	4,598.24	0.00	5,992.64
Xylenes (mixed isomers)	3.65	5.76	12.41	0.00	21.82
MUL Gasoline (RVP 9.0)	305.98	12.51	1,001.30	0.00	1,319.79
1,2,4-Trimethylbenzene	0.04	0.30	0.15	0.00	0.49
2,2,4-Trimethylpentane (isooctane)	2.16	0.50	7.07	0.00	9.73
Benzene	1.98	0.23	6.48	0.00	8.69
Cyclohexane	1.05	0.12	3.43	0.00	4.60
Ethylbenzene	0.15	0.18	0.48	0.00	0.81

	4.64	0.33	15.19	0.00	20.16
Naphthalene	0.00	0.01	0.00	0.00	0.02
Toluene	3.71	1.54	12.13	0.00	17.38
Unidentified Components	291.50	8.13	953.89	0.00	1,253.52
Xylenes (mixed isomers)	0.76	1.15	2.48	0.00	4.39

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	325
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULR87PAS

**Tank Dimensions**

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	39.45

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Double Deck
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	17
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 325 - External Floating Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
MUL Gasoline (RVP 12.5)	Jan	42.19	38.38	46.01	51.98	4.7034	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0398	0.0042	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0186	0.0040	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0095	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0266	0.0096	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.1233	0.0070	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.8555	N/A	N/A	63.4545	0.6500	0.9714	88.97	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0922	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 13.0)	Feb	45.35	40.84	49.87	51.98	5.2428	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0398	0.0043	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0186	0.0040	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0266	0.0097	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.1233	0.0072	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.6436	N/A	N/A	61.4192	0.6500	0.9708	88.97	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0922	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Mar	49.25	43.96	54.55	51.98	3.4801	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0398	0.0067	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0186	0.0062	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0095	0.0033	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0266	0.0149	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.1233	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0019	N/A	N/A	67.2097	0.6500	0.9549	88.97	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0922	0.0022	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Apr	53.24	46.98	59.49	51.98	3.7765	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0398	0.0070	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0186	0.0064	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0266	0.0153	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61

Toluene						0.2665	N/A	N/A	92.1300	0.1233	0.0118	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4209	N/A	N/A	67.1773	0.6500	0.9532	88.97	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0922	0.0023	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	May	57.74	50.54	64.93	51.98	4.1357	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0398	0.0073	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0186	0.0067	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0095	0.0035	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0266	0.0157	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.1233	0.0124	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9277	N/A	N/A	67.1399	0.6500	0.9513	88.97	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Jun	62.65	54.94	70.36	51.98	4.2629	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0398	0.0081	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0186	0.0074	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0095	0.0039	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0266	0.0173	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.1233	0.0140	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.0831	N/A	N/A	67.0329	0.6500	0.9456	88.97	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0922	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Jul	66.53	58.63	74.43	51.98	4.9172	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0398	0.0079	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0186	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0095	0.0038	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0147	0.0006	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0266	0.0166	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.1233	0.0137	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.0267	N/A	N/A	67.0647	0.6500	0.9474	88.97	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0922	0.0029	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.5)	Aug	65.15	57.72	72.57	51.98	4.7869	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0242	0.0002	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0398	0.0078	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0186	0.0071	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0095	0.0037	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0266	0.0164	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.1233	0.0135	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.8438	N/A	N/A	67.0767	0.6500	0.9480	88.97	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0922	0.0028	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 9.0)	Sep	59.98	52.93	67.04	51.98	4.6097	N/A	N/A	67.0000			92.00	Option 4: RVP=9, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0398	0.0071	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0186	0.0065	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0095	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0147	0.0005	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0266	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.1233	0.0121	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6178	N/A	N/A	66.1409	0.6500	0.9527	88.97	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0922	0.0025	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 11.0)	Oct	54.07	48.01	60.13	51.98	5.1418	N/A	N/A	65.0000			92.00	Option 4: RVP=11, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0398	0.0055	114.23	Option 2: A=6.8118, B=1257.84, C=220.74

Benzene						0.9885	N/A	N/A	78.1100	0.0186	0.0051	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0095	0.0027	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0147	0.0004	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0266	0.0120	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0019	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.1233	0.0093	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.4470	N/A	N/A	64.3045	0.6500	0.9632	88.97	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0922	0.0019	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.5)	Nov	48.04	43.61	52.46	51.98	5.2837	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0398	0.0045	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0186	0.0042	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0095	0.0022	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0266	0.0101	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.1233	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.6913	N/A	N/A	63.4170	0.6500	0.9696	88.97	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0922	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 11.5)	Dec	42.89	39.34	46.44	51.98	4.3293	N/A	N/A	65.0000			92.00	Option 4: RVP=11.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0242	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0398	0.0046	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0186	0.0043	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0095	0.0023	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0147	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0266	0.0105	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0011	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.1233	0.0076	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.2960	N/A	N/A	64.4157	0.6500	0.9688	88.97	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0922	0.0015	106.17	Option 2: A=7.009, B=1462.266, C=215.11



## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 325 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	513.4176	631.1279	500.6349	575.3391	624.2182	647.7860	785.6402	780.6395	673.6938	686.8423	647.6708	478.2487
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.1158	0.1331	0.0803	0.0885	0.0987	0.1024	0.1225	0.1184	0.1129	0.1298	0.1345	0.1044
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.7034	5.2428	3.4801	3.7765	4.1357	4.2629	4.9172	4.7869	4.6097	5.1418	5.2837	4.3293
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	64.0000	62.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	65.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	671.5690	862.1845	739.1225	864.6331	927.1106	962.1144	1,173.7876	1,179.9747	982.5812	964.1125	878.6087	630.2646
Value of Vapor Pressure Function:	0.1158	0.1331	0.0803	0.0885	0.0987	0.1024	0.1225	0.1184	0.1129	0.1298	0.1345	0.1044
Vapor Molecular Weight (lb/lb-mole):	64.0000	62.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	67.0000	65.0000	64.0000	65.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,087.6128	1,253.8357	1,624.2390	1,724.7515	1,657.3914	1,657.3914	1,690.8956	1,758.9591	1,558.9892	1,371.6788	1,225.2536	1,114.4384
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,197.4946	1,505.8204	1,252.2654	1,452.4802	1,563.8368	1,622.4084	1,971.9357	1,973.1221	1,668.7829	1,663.4627	1,538.7874	1,121.0212
Roof Fitting/Status	Quantity		KF <sub>a</sub> (lb-mole/yr)		Roof Fitting Loss Factors KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))		m		Losses(lb)			
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1		1.60		0.00		0.00		11.8016			
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1		31.00		36.00		2.00		10,346.0313			
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1		0.71		0.10		1.00		9.7720			
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	17		0.82		0.53		0.14		188.4781			
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1		4.30		17.00		0.38		281.5107			

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**325 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
MUL Gasoline (RVP 11.0)	686.84	12.51	964.11	0.00	1,663.46
1,2,4-Trimethylbenzene	0.07	0.30	0.10	0.00	0.48
2,2,4-Trimethylpentane (isooctane)	3.77	0.50	5.29	0.00	9.56
Benzene	3.48	0.23	4.88	0.00	8.59
Cyclohexane	1.85	0.12	2.60	0.00	4.57
Ethylbenzene	0.25	0.18	0.34	0.00	0.77
Hexane (-n)	8.24	0.33	11.56	0.00	20.13
Naphthalene	0.00	0.01	0.00	0.00	0.01
Toluene	6.38	1.54	8.96	0.00	16.88
Unidentified Components	661.53	8.13	928.59	0.00	1,598.25
Xylenes (mixed isomers)	1.27	1.15	1.79	0.00	4.22
MUL Gasoline (RVP 11.5)	478.25	12.51	630.26	0.00	1,121.02
1,2,4-Trimethylbenzene	0.04	0.30	0.05	0.00	0.39
2,2,4-Trimethylpentane (isooctane)	2.22	0.50	2.92	0.00	5.64
Benzene	2.07	0.23	2.73	0.00	5.03
Cyclohexane	1.11	0.12	1.47	0.00	2.70
Ethylbenzene	0.13	0.18	0.18	0.00	0.50
Hexane (-n)	5.01	0.33	6.60	0.00	11.95
Naphthalene	0.00	0.01	0.00	0.00	0.01
Toluene	3.65	1.54	4.81	0.00	10.01
Unidentified Components	463.32	8.13	610.59	0.00	1,082.03
Xylenes (mixed isomers)	0.70	1.15	0.92	0.00	2.76
MUL Gasoline (RVP 12.5)	1,161.09	25.02	1,550.18	0.00	2,736.28
1,2,4-Trimethylbenzene	0.09	0.60	0.12	0.00	0.81

2,2,4-Trimethylpentane (isooctane)	5.11	1.00	6.82	0.00	12.93
Benzene	4.76	0.47	6.35	0.00	11.58
Cyclohexane	2.55	0.24	3.40	0.00	6.19
Ethylbenzene	0.31	0.37	0.42	0.00	1.10
Hexane (-n)	11.45	0.67	15.29	0.00	27.40
Naphthalene	0.00	0.03	0.00	0.00	0.03
Toluene	8.47	3.08	11.31	0.00	22.86
Unidentified Components	1,126.73	16.26	1,504.27	0.00	2,647.26
Xylenes (mixed isomers)	1.63	2.31	2.18	0.00	6.12
MUL Gasoline (RVP 13.0)	631.13	12.51	862.18	0.00	1,505.82
1,2,4-Trimethylbenzene	0.05	0.30	0.07	0.00	0.42
2,2,4-Trimethylpentane (isooctane)	2.74	0.50	3.74	0.00	6.97
Benzene	2.55	0.23	3.48	0.00	6.26
Cyclohexane	1.36	0.12	1.86	0.00	3.35
Ethylbenzene	0.17	0.18	0.23	0.00	0.58
Hexane (-n)	6.13	0.33	8.38	0.00	14.84
Naphthalene	0.00	0.01	0.00	0.00	0.01
Toluene	4.53	1.54	6.19	0.00	12.27
Unidentified Components	612.73	8.13	837.04	0.00	1,457.90
Xylenes (mixed isomers)	0.87	1.15	1.19	0.00	3.22
MUL Gasoline (RVP 8.0)	647.79	12.51	962.11	0.00	1,622.41
1,2,4-Trimethylbenzene	0.11	0.30	0.17	0.00	0.58
2,2,4-Trimethylpentane (isooctane)	5.26	0.50	7.81	0.00	13.57
Benzene	4.80	0.23	7.14	0.00	12.17
Cyclohexane	2.54	0.12	3.78	0.00	6.44
Ethylbenzene	0.36	0.18	0.54	0.00	1.08
Hexane (-n)	11.21	0.33	16.66	0.00	28.20
Naphthalene	0.00	0.01	0.00	0.00	0.02
Toluene	9.08	1.54	13.49	0.00	24.11
Unidentified Components	612.53	8.13	909.75	0.00	1,530.41
Xylenes (mixed isomers)	1.88	1.15	2.79	0.00	5.82
MUL Gasoline (RVP 8.5)	3,266.47	62.54	4,884.63	0.00	8,213.64
1,2,4-Trimethylbenzene	0.50	1.51	0.75	0.00	2.76
2,2,4-Trimethylpentane (isooctane)	24.13	2.49	36.10	0.00	62.72
Benzene	22.11	1.16	33.07	0.00	56.34
Cyclohexane	11.73	0.59	17.54	0.00	29.87
Ethylbenzene	1.63	0.92	2.43	0.00	4.98

	51.87	1.66	77.58	0.00	131.11
Naphthalene	0.00	0.07	0.00	0.00	0.08
Toluene	41.40	7.71	61.93	0.00	111.04
Unidentified Components	3,104.63	40.65	4,642.55	0.00	7,787.83
Xylenes (mixed isomers)	8.47	5.76	12.67	0.00	26.91
MUL Gasoline (RVP 9.0)	673.69	12.51	982.58	0.00	1,668.78
1,2,4-Trimethylbenzene	0.10	0.30	0.14	0.00	0.55
2,2,4-Trimethylpentane (isooctane)	4.76	0.50	6.94	0.00	12.19
Benzene	4.36	0.23	6.36	0.00	10.95
Cyclohexane	2.31	0.12	3.37	0.00	5.80
Ethylbenzene	0.32	0.18	0.47	0.00	0.97
Hexane (-n)	10.22	0.33	14.90	0.00	25.45
Naphthalene	0.00	0.01	0.00	0.00	0.02
Toluene	8.16	1.54	11.91	0.00	21.61
Unidentified Components	641.80	8.13	936.06	0.00	1,585.99
Xylenes (mixed isomers)	1.67	1.15	2.44	0.00	5.26

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	326
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULP91WIN

**Tank Dimensions**

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	39.45

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Double Deck
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Roof Drain (3-in. Diameter)/90% Closed	3
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	5
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	12

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 326 - External Floating Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
PUL Gasoline (RVP 13.5)	Jan	42.19	38.38	46.01	51.98	5.1445	N/A	N/A	62.0000			92.00	Option 4: RVP=13.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0286	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0232	0.0047	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0090	0.0019	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0366	0.0124	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.0988	0.0053	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6623	N/A	N/A	61.4781	0.7506	0.9722	91.21	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 13.5)	Feb	45.35	40.84	49.87	51.98	5.4766	N/A	N/A	62.0000			92.00	Option 4: RVP=13.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0286	0.0030	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0232	0.0048	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0090	0.0020	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0366	0.0128	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0988	0.0055	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.0877	N/A	N/A	61.4601	0.7506	0.9713	91.21	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 10.0)	Mar	49.25	43.96	54.55	51.98	4.1916	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0286	0.0041	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0232	0.0066	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0090	0.0027	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0366	0.0175	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0988	0.0077	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3727	N/A	N/A	65.3215	0.7506	0.9605	91.21	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0366	0.0007	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 8.0)	Apr	53.24	46.98	59.49	51.98	3.5258	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0286	0.0054	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0232	0.0086	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0090	0.0035	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0366	0.0225	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61

Toluene						0.2665	N/A	N/A	92.1300	0.0988	0.0101	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.4732	N/A	N/A	67.1660	0.7506	0.9488	91.21	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0366	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.5)	May	57.74	50.54	64.93	51.98	3.5944	N/A	N/A	68.0000			92.00	Option 4: RVP=7.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0286	0.0060	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0232	0.0096	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0090	0.0038	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0366	0.0248	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0988	0.0114	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.5389	N/A	N/A	67.0639	0.7506	0.9429	91.21	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0366	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.5)	Jun	62.65	54.94	70.36	51.98	3.9689	N/A	N/A	68.0000			92.00	Option 4: RVP=7.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0286	0.0063	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0232	0.0099	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0090	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0065	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0366	0.0255	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0988	0.0121	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.0029	N/A	N/A	67.0240	0.7506	0.9407	91.21	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0366	0.0012	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.0)	Jul	66.53	58.63	74.43	51.98	3.9739	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0286	0.0070	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0232	0.0110	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0090	0.0044	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0065	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0366	0.0282	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.0988	0.0136	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.9829	N/A	N/A	66.9087	0.7506	0.9341	91.21	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0366	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.0)	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0286	0.0069	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0232	0.0109	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0090	0.0044	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0065	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0366	0.0280	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.0988	0.0134	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.8499	N/A	N/A	66.9208	0.7506	0.9348	91.21	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0366	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 8.5)	Sep	59.98	52.93	67.04	51.98	4.3252	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0286	0.0053	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0232	0.0085	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0090	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0366	0.0219	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.0988	0.0102	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4906	N/A	N/A	67.1750	0.7506	0.9494	91.21	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0366	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 11.0)	Oct	54.07	48.01	60.13	51.98	5.1418	N/A	N/A	65.0000			92.00	Option 4: RVP=11, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0286	0.0039	114.23	Option 2: A=6.8118, B=1257.84, C=220.74

Benzene						0.9885	N/A	N/A	78.1100	0.0232	0.0063	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0090	0.0025	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0366	0.0165	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0019	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.0988	0.0074	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.6033	N/A	N/A	64.3356	0.7506	0.9624	91.21	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0366	0.0007	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 12.5)	Nov	48.04	43.61	52.46	51.98	5.2837	N/A	N/A	64.0000			92.00	Option 4: RVP=12.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0286	0.0032	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0232	0.0052	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0090	0.0021	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0366	0.0138	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.0988	0.0061	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.8210	N/A	N/A	63.4383	0.7506	0.9688	91.21	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0366	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 13.5)	Dec	42.89	39.34	46.44	51.98	5.2168	N/A	N/A	62.0000			92.00	Option 4: RVP=13.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0286	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0232	0.0047	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0090	0.0019	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0366	0.0125	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.0988	0.0053	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.7549	N/A	N/A	61.4742	0.7506	0.9720	91.21	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11



## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 326 - External Floating Roof Tank Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	557.8383	668.4588	607.1625	530.3281	527.5208	593.8018	603.1530	599.9219	631.6722	686.8423	647.6708	577.7259
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.1299	0.1410	0.1003	0.0815	0.0834	0.0939	0.0940	0.0910	0.1043	0.1298	0.1345	0.1322
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	5.1445	5.4766	4.1916	3.5258	3.5944	3.9689	3.9739	3.8659	4.3252	5.1418	5.2837	5.2168
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	743.4714	929.2294	910.2323	808.9333	795.4656	895.4127	914.7786	920.2709	935.8035	980.3004	894.2314	775.5779
Value of Vapor Pressure Function:	0.1299	0.1410	0.1003	0.0815	0.0834	0.0939	0.0940	0.0910	0.1043	0.1298	0.1345	0.1322
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	65.0000	64.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,108.1802	1,275.8692	1,649.3085	1,750.5987	1,682.7194	1,682.7194	1,716.4828	1,785.0670	1,583.5441	1,394.7099	1,247.0400	1,135.2474
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,313.8176	1,610.1961	1,529.9028	1,351.7694	1,335.4944	1,501.7224	1,530.4396	1,532.7007	1,579.9836	1,679.6506	1,554.4101	1,365.8118

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> n))		
Roof Drain (3-in. Diameter)/90% Closed	3	1.80	0.14	1.10	60.5401
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	2	6.20	1.20	0.94	182.4427
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	9,853.2422
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.4406
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	5	0.82	0.53	0.14	53.7071
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	12	2.00	0.37	0.91	335.9267

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**326 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
PUL Gasoline (RVP 10.0)	607.16	12.51	910.23	0.00	1,529.90
1,2,4-Trimethylbenzene	0.02	0.10	0.03	0.00	0.16
2,2,4-Trimethylpentane (isooctane)	2.50	0.36	3.75	0.00	6.61
Benzene	4.02	0.29	6.03	0.00	10.34
Cyclohexane	1.63	0.11	2.44	0.00	4.18
Ethylbenzene	0.10	0.08	0.15	0.00	0.32
Hexane (-n)	10.61	0.46	15.90	0.00	26.96
Naphthalene	0.00	0.02	0.00	0.00	0.03
Toluene	4.67	1.24	7.01	0.00	12.92
Unidentified Components	583.16	9.39	874.25	0.00	1,466.79
Xylenes (mixed isomers)	0.45	0.46	0.68	0.00	1.59
PUL Gasoline (RVP 11.0)	686.84	12.51	980.30	0.00	1,679.65
1,2,4-Trimethylbenzene	0.03	0.10	0.04	0.00	0.16
2,2,4-Trimethylpentane (isooctane)	2.70	0.36	3.86	0.00	6.92
Benzene	4.33	0.29	6.18	0.00	10.79
Cyclohexane	1.75	0.11	2.49	0.00	4.35
Ethylbenzene	0.11	0.08	0.15	0.00	0.34
Hexane (-n)	11.31	0.46	16.15	0.00	27.92
Naphthalene	0.00	0.02	0.00	0.00	0.03
Toluene	5.12	1.24	7.30	0.00	13.65
Unidentified Components	660.99	9.39	943.41	0.00	1,613.79
Xylenes (mixed isomers)	0.51	0.46	0.72	0.00	1.69
PUL Gasoline (RVP 12.5)	647.67	12.51	894.23	0.00	1,554.41
1,2,4-Trimethylbenzene	0.02	0.10	0.03	0.00	0.15

2,2,4-Trimethylpentane (isooctane)	2.10	0.36	2.90	0.00	5.36
Benzene	3.39	0.29	4.68	0.00	8.35
Cyclohexane	1.37	0.11	1.90	0.00	3.38
Ethylbenzene	0.08	0.08	0.11	0.00	0.27
Hexane (-n)	8.95	0.46	12.36	0.00	21.77
Naphthalene	0.00	0.02	0.00	0.00	0.03
Toluene	3.92	1.24	5.41	0.00	10.57
Unidentified Components	627.46	9.39	866.33	0.00	1,503.17
Xylenes (mixed isomers)	0.38	0.46	0.52	0.00	1.36
PUL Gasoline (RVP 13.5)	1,804.02	37.52	2,448.28	0.00	4,289.83
1,2,4-Trimethylbenzene	0.04	0.31	0.06	0.00	0.41
2,2,4-Trimethylpentane (isooctane)	5.27	1.07	7.15	0.00	13.48
Benzene	8.53	0.87	11.57	0.00	20.97
Cyclohexane	3.47	0.34	4.71	0.00	8.51
Ethylbenzene	0.20	0.24	0.27	0.00	0.71
Hexane (-n)	22.72	1.37	30.84	0.00	54.94
Naphthalene	0.00	0.07	0.00	0.00	0.08
Toluene	9.71	3.71	13.18	0.00	26.59
Unidentified Components	1,753.18	28.17	2,379.26	0.00	4,160.60
Xylenes (mixed isomers)	0.92	1.37	1.25	0.00	3.54
PUL Gasoline (RVP 7.0)	1,203.07	25.02	1,835.05	0.00	3,063.14
1,2,4-Trimethylbenzene	0.09	0.21	0.14	0.00	0.43
2,2,4-Trimethylpentane (isooctane)	8.34	0.71	12.72	0.00	21.78
Benzene	13.18	0.58	20.10	0.00	33.85
Cyclohexane	5.28	0.22	8.05	0.00	13.56
Ethylbenzene	0.36	0.16	0.55	0.00	1.06
Hexane (-n)	33.76	0.91	51.49	0.00	86.16
Naphthalene	0.00	0.05	0.00	0.00	0.06
Toluene	16.21	2.47	24.73	0.00	43.42
Unidentified Components	1,124.18	18.78	1,714.71	0.00	2,857.67
Xylenes (mixed isomers)	1.68	0.91	2.56	0.00	5.16
PUL Gasoline (RVP 7.5)	1,121.32	25.02	1,690.88	0.00	2,837.22
1,2,4-Trimethylbenzene	0.07	0.21	0.10	0.00	0.38
2,2,4-Trimethylpentane (isooctane)	6.88	0.71	10.37	0.00	17.97
Benzene	10.93	0.58	16.48	0.00	27.99
Cyclohexane	4.40	0.22	6.63	0.00	11.25
Ethylbenzene	0.29	0.16	0.43	0.00	0.88

	28.26	0.91	42.62	0.00	71.80
Naphthalene	0.00	0.05	0.00	0.00	0.05
Toluene	13.21	2.47	19.91	0.00	35.59
Unidentified Components	1,055.95	18.78	1,592.30	0.00	2,667.03
Xylenes (mixed isomers)	1.34	0.91	2.02	0.00	4.27
PUL Gasoline (RVP 8.0)	530.33	12.51	808.93	0.00	1,351.77
1,2,4-Trimethylbenzene	0.03	0.10	0.04	0.00	0.17
2,2,4-Trimethylpentane (isooctane)	2.84	0.36	4.33	0.00	7.53
Benzene	4.55	0.29	6.94	0.00	11.77
Cyclohexane	1.84	0.11	2.80	0.00	4.75
Ethylbenzene	0.11	0.08	0.17	0.00	0.37
Hexane (-n)	11.91	0.46	18.16	0.00	30.53
Naphthalene	0.00	0.02	0.00	0.00	0.03
Toluene	5.36	1.24	8.18	0.00	14.77
Unidentified Components	503.17	9.39	767.50	0.00	1,280.06
Xylenes (mixed isomers)	0.53	0.46	0.81	0.00	1.79
PUL Gasoline (RVP 8.5)	631.67	12.51	935.80	0.00	1,579.98
1,2,4-Trimethylbenzene	0.03	0.10	0.05	0.00	0.19
2,2,4-Trimethylpentane (isooctane)	3.36	0.36	4.98	0.00	8.70
Benzene	5.34	0.29	7.91	0.00	13.54
Cyclohexane	2.15	0.11	3.18	0.00	5.44
Ethylbenzene	0.14	0.08	0.21	0.00	0.43
Hexane (-n)	13.82	0.46	20.47	0.00	34.75
Naphthalene	0.00	0.02	0.00	0.00	0.03
Toluene	6.44	1.24	9.55	0.00	17.23
Unidentified Components	599.73	9.39	888.48	0.00	1,497.60
Xylenes (mixed isomers)	0.65	0.46	0.97	0.00	2.08

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	327
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline

**Tank Dimensions**

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	39.45

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Drain (3-in. Diameter)/90% Closed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**

## Liquid Contents of Storage Tank

### 327 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
MUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0053	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	N/A	N/A	154.2000	0.0026	0.0000	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	N/A	N/A	128.2000	0.0030	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						4.9761	N/A	N/A	61.9983	0.9858	0.9999	91.67	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0034	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.0)	Feb	45.35	40.84	49.87	51.98	4.7796	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0171	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	N/A	N/A	154.2000	0.0030	0.0000	154.20	Option 1: VP40 = .000059 VP50 = .000108
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0008	0.0000	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0013	N/A	N/A	128.2000	0.0051	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0018	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.9332	N/A	N/A	63.9908	0.9603	0.9996	91.21	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0120	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Mar	49.25	43.96	54.55	51.98	3.2468	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0015	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2765	N/A	N/A	67.9951	0.9886	0.9998	91.80	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 7.0)	Apr	53.24	46.98	59.49	51.98	3.0306	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0025	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0018	N/A	N/A	128.2000	0.0045	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.0008	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.0520	N/A	N/A	67.9967	0.9908	0.9998	91.81	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0013	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	May	57.74	50.54	64.93	51.98	3.8641	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0022	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8993	N/A	N/A	67.9944	0.9886	0.9998	91.80	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Jun	62.65	54.94	70.36	51.98	4.2629	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0028	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3018	N/A	N/A	67.9940	0.9886	0.9997	91.80	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.5)	Jul	66.53	58.63	74.43	51.98	4.9172	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 8.5)	Aug	65.15	57.72	72.57	51.98	4.7869	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 8.5)	Sep	59.98	52.93	67.04	51.98	4.3252	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 10.5)	Oct	54.07	48.01	60.13	51.98	4.8783	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
RUL Gasoline (RVP 12.0)	Nov	48.04	43.61	52.46	51.98	5.0418	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3
RUL Gasoline (RVP 12.0)	Dec	42.89	39.34	46.44	51.98	4.5490	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 327 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	527.1045	578.3646	461.6877	444.8365	574.9755	647.7860	785.6402	780.6395	631.6722	651.7523	609.3896	500.7290
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.1227	0.1182	0.0741	0.0684	0.0909	0.1024	0.1225	0.1184	0.1043	0.1213	0.1265	0.1110
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	4.7796	3.2468	3.0306	3.8641	4.2629	4.9172	4.7869	4.3252	4.8783	5.0418	4.5490
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080	12.5080
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	704.8506	806.0426	693.0996	679.3102	868.1538	978.0902	1,193.0106	1,198.7803	937.2531	932.1846	843.6267	674.3573
Value of Vapor Pressure Function:	0.1227	0.1182	0.0741	0.0684	0.0909	0.1024	0.1225	0.1184	0.1043	0.1213	0.1265	0.1110
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,111.8723	1,279.1284	1,651.5889	1,752.6138	1,684.9122	1,684.9122	1,718.5872	1,786.9921	1,585.9971	1,397.6585	1,250.3743	1,138.8703
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,244.4631	1,396.9151	1,167.2953	1,136.6547	1,455.6373	1,638.3842	1,991.1587	1,991.9277	1,581.4332	1,596.4449	1,465.5242	1,187.5943

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> ))		
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.2906
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	9,861.1809
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	90.3398
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	19.9728
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	269.1307
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12	0.82	0.53	0.14	127.2647
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5	2.00	0.37	0.91	138.5787

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**327 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
MUL Gasoline (RVP 13.0)	527.10	12.51	704.85	0.00	1,244.46
1,2,4-Trimethylbenzene	0.01	0.07	0.01	0.00	0.08
Biphenyl	0.00	0.03	0.00	0.00	0.03
Naphthalene	0.00	0.04	0.00	0.00	0.04
Unidentified Components	527.07	12.33	704.80	0.00	1,244.21
Xylenes (mixed isomers)	0.03	0.04	0.03	0.00	0.10
MUL Gasoline (RVP 12.0)	578.36	12.51	806.04	0.00	1,396.92
1,2,4-Trimethylbenzene	0.03	0.21	0.05	0.00	0.29
Biphenyl	0.00	0.04	0.00	0.00	0.04
Ethylbenzene	0.01	0.01	0.01	0.00	0.03
Naphthalene	0.00	0.06	0.00	0.00	0.07
Toluene	0.06	0.02	0.09	0.00	0.17
Unidentified Components	578.15	12.01	805.74	0.00	1,395.90
Xylenes (mixed isomers)	0.11	0.15	0.15	0.00	0.42
MUL Gasoline (RVP 7.0)	444.84	12.51	679.31	0.00	1,136.65
1,2,4-Trimethylbenzene	0.01	0.03	0.01	0.00	0.05
Naphthalene	0.00	0.06	0.00	0.00	0.06
Toluene	0.04	0.01	0.06	0.00	0.12
Unidentified Components	444.77	12.39	679.20	0.00	1,136.36
Xylenes (mixed isomers)	0.02	0.02	0.03	0.00	0.06
MUL Gasoline (RVP 8.0)	1,684.45	37.52	2,539.34	0.00	4,261.32
1,2,4-Trimethylbenzene	0.04	0.14	0.06	0.00	0.24
Naphthalene	0.00	0.10	0.01	0.00	0.11
Toluene	0.17	0.04	0.26	0.00	0.47



Unidentified Components	1,684.03	37.10	2,538.71	0.00	4,259.84
Xylenes (mixed isomers)	0.20	0.15	0.30	0.00	0.66
RUL Gasoline (RVP 8.5)	2,197.95	37.52	3,329.04	0.00	5,564.52
RUL Gasoline (RVP 10.5)	651.75	12.51	932.18	0.00	1,596.44
RUL Gasoline (RVP 12.0)	1,110.12	25.02	1,517.98	0.00	2,653.12

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	327
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline

**Tank Dimensions**

Diameter (ft):	114.50
Volume (gallons):	2,310,000.00
Turnovers:	11.89

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Pontoon
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Roof Drain (3-in. Diameter)/90% Closed	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**

## Liquid Contents of Storage Tank

### 327 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
MUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0053	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	N/A	N/A	154.2000	0.0026	0.0000	154.20	Option 1: VP40 = .000059 VP50 = .000108
Naphthalene						0.0011	N/A	N/A	128.2000	0.0030	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Unidentified Components						4.9761	N/A	N/A	61.9983	0.9858	0.9999	91.67	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0034	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 12.0)	Feb	45.35	40.84	49.87	51.98	4.7796	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0171	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Biphenyl						0.0001	N/A	N/A	154.2000	0.0030	0.0000	154.20	Option 1: VP40 = .000059 VP50 = .000108
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0008	0.0000	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Naphthalene						0.0013	N/A	N/A	128.2000	0.0051	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0018	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.9332	N/A	N/A	63.9908	0.9603	0.9996	91.21	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0120	0.0002	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Mar	49.25	43.96	54.55	51.98	3.2468	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0015	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2765	N/A	N/A	67.9951	0.9886	0.9998	91.80	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 7.0)	Apr	53.24	46.98	59.49	51.98	3.0306	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0025	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0018	N/A	N/A	128.2000	0.0045	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.0008	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.0520	N/A	N/A	67.9967	0.9908	0.9998	91.81	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0013	0.0000	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	May	57.74	50.54	64.93	51.98	3.8641	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0022	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8993	N/A	N/A	67.9944	0.9886	0.9998	91.80	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
MUL Gasoline (RVP 8.0)	Jun	62.65	54.94	70.36	51.98	4.2629	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0036	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
Naphthalene						0.0028	N/A	N/A	128.2000	0.0026	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0010	0.0001	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.3018	N/A	N/A	67.9940	0.9886	0.9997	91.80	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0041	0.0001	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.5)	Jul	66.53	58.63	74.43	51.98	4.9172	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 8.5)	Aug	65.15	57.72	72.57	51.98	4.7869	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 8.5)	Sep	59.98	52.93	67.04	51.98	4.3252	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
RUL Gasoline (RVP 10.5)	Oct	54.07	48.01	60.13	51.98	4.8783	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
RUL Gasoline (RVP 12.0)	Nov	48.04	43.61	52.46	51.98	5.0418	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3
RUL Gasoline (RVP 12.0)	Dec	42.89	39.34	46.44	51.98	4.5490	N/A	N/A	64.0000			92.00	Option 4: RVP=12, ASTM Slope=3

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 327 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	527.1045	578.3646	461.6877	444.8365	574.9755	647.7860	785.6402	780.6395	631.6722	651.7523	609.3896	500.7290
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.1227	0.1182	0.0741	0.0684	0.0909	0.1024	0.1225	0.1184	0.1043	0.1213	0.1265	0.1110
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	4.7796	3.2468	3.0306	3.8641	4.2629	4.9172	4.7869	4.3252	4.8783	5.0418	4.5490
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704	3.7704
Net Throughput (gal/mo.):	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830	2,288,999.5830
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000	114.5000
Roof Fitting Losses (lb):	704.8506	806.0426	693.0996	679.3102	868.1538	978.0902	1,193.0106	1,198.7803	937.2531	932.1846	843.6267	674.3573
Value of Vapor Pressure Function:	0.1227	0.1182	0.0741	0.0684	0.0909	0.1024	0.1225	0.1184	0.1043	0.1213	0.1265	0.1110
Vapor Molecular Weight (lb/lb-mole):	62.0000	64.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	64.0000	64.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,111.8723	1,279.1284	1,651.5889	1,752.6138	1,684.9122	1,684.9122	1,718.5872	1,786.9921	1,585.9971	1,397.6585	1,250.3743	1,138.8703
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,235.7254	1,388.1775	1,158.5577	1,127.9171	1,446.8997	1,629.6466	1,982.4211	1,983.1901	1,572.6956	1,587.7073	1,456.7866	1,178.8567

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> ))		
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.2906
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	9,861.1809
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	90.3398
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	19.9728
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	269.1307
Roof Leg (3-in. Diameter)/Adjustable, Center Area, Ungasketed	12	0.82	0.53	0.14	127.2647
Roof Leg (3-in. Diameter)/Adjustable, Pontoon Area, Ungasketed	5	2.00	0.37	0.91	138.5787

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**327 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
MUL Gasoline (RVP 13.0)	527.10	3.77	704.85	0.00	1,235.73
1,2,4-Trimethylbenzene	0.01	0.02	0.01	0.00	0.04
Biphenyl	0.00	0.01	0.00	0.00	0.01
Naphthalene	0.00	0.01	0.00	0.00	0.01
Unidentified Components	527.07	3.72	704.80	0.00	1,235.59
Xylenes (mixed isomers)	0.03	0.01	0.03	0.00	0.07
MUL Gasoline (RVP 12.0)	578.36	3.77	806.04	0.00	1,388.18
1,2,4-Trimethylbenzene	0.03	0.06	0.05	0.00	0.14
Biphenyl	0.00	0.01	0.00	0.00	0.01
Ethylbenzene	0.01	0.00	0.01	0.00	0.02
Naphthalene	0.00	0.02	0.00	0.00	0.02
Toluene	0.06	0.01	0.09	0.00	0.16
Unidentified Components	578.15	3.62	805.74	0.00	1,387.51
Xylenes (mixed isomers)	0.11	0.05	0.15	0.00	0.31
MUL Gasoline (RVP 7.0)	444.84	3.77	679.31	0.00	1,127.92
1,2,4-Trimethylbenzene	0.01	0.01	0.01	0.00	0.03
Naphthalene	0.00	0.02	0.00	0.00	0.02
Toluene	0.04	0.00	0.06	0.00	0.11
Unidentified Components	444.77	3.74	679.20	0.00	1,127.71
Xylenes (mixed isomers)	0.02	0.00	0.03	0.00	0.05
MUL Gasoline (RVP 8.0)	1,684.45	11.31	2,539.34	0.00	4,235.10
1,2,4-Trimethylbenzene	0.04	0.04	0.06	0.00	0.14
Naphthalene	0.00	0.03	0.01	0.00	0.04
Toluene	0.17	0.01	0.26	0.00	0.45

Unidentified Components	1,684.03	11.18	2,538.71	0.00	4,233.93
Xylenes (mixed isomers)	0.20	0.05	0.30	0.00	0.55
RUL Gasoline (RVP 8.5)	2,197.95	11.31	3,329.04	0.00	5,538.31
RUL Gasoline (RVP 10.5)	651.75	3.77	932.18	0.00	1,587.71
RUL Gasoline (RVP 12.0)	1,110.12	7.54	1,517.98	0.00	2,635.64

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Tank Identification and Physical Characteristics**

**Identification**

User Identification:	330
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	External Floating Roof Tank
Description:	Gasoline-ULP91IDA

**Tank Dimensions**

Diameter (ft):	73.50
Volume (gallons):	1,011,000.00
Turnovers:	90.13

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good

**Roof Characteristics**

Type:	Double Deck
Fitting Category	Detail

**Tank Construction and Rim-Seal System**

Construction:	Riveted
Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Fitting/Status****Quantity**

Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	10
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1
Roof Drain (3-in. Diameter)/90% Closed	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**

## Liquid Contents of Storage Tank

### 330 - External Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
PUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0286	0.0030	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0232	0.0049	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0090	0.0020	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0366	0.0130	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1850	N/A	N/A	92.1300	0.0988	0.0055	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.3700	N/A	N/A	61.4542	0.7506	0.9710	91.21	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 13.0)	Feb	45.35	40.84	49.87	51.98	5.2428	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0286	0.0031	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0232	0.0050	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0090	0.0020	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0366	0.0133	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0013	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2058	N/A	N/A	92.1300	0.0988	0.0058	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.7789	N/A	N/A	61.4355	0.7506	0.9700	91.21	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.5)	Mar	49.25	43.96	54.55	51.98	3.0156	N/A	N/A	68.0000			92.00	Option 4: RVP=7.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0286	0.0056	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0232	0.0089	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0090	0.0036	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0366	0.0236	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0015	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2342	N/A	N/A	92.1300	0.0988	0.0104	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8194	N/A	N/A	67.1313	0.7506	0.9467	91.21	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0366	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.0)	Apr	53.24	46.98	59.49	51.98	3.0306	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0286	0.0062	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0232	0.0100	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0090	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0366	0.0261	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0018	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2665	N/A	N/A	92.1300	0.0988	0.0118	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8192	N/A	N/A	67.0231	0.7506	0.9404	91.21	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0366	0.0012	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 8.5)	May	57.74	50.54	64.93	51.98	4.1357	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3



1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0286	0.0052	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0232	0.0083	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0090	0.0033	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0366	0.0216	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0022	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3076	N/A	N/A	92.1300	0.0988	0.0099	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2539	N/A	N/A	67.1913	0.7506	0.9504	91.21	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0366	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 8.0)	Jun	62.65	54.94	70.36	51.98	4.2629	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0286	0.0058	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0232	0.0092	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0090	0.0037	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0366	0.0238	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0028	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3584	N/A	N/A	92.1300	0.0988	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3913	N/A	N/A	67.0943	0.7506	0.9448	91.21	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0366	0.0012	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.5)	Jul	66.53	58.63	74.43	51.98	4.2864	N/A	N/A	68.0000			92.00	Option 4: RVP=7.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0286	0.0065	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0232	0.0102	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0090	0.0041	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0065	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0366	0.0261	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0033	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.4034	N/A	N/A	92.1300	0.0988	0.0126	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.3955	N/A	N/A	66.9922	0.7506	0.9389	91.21	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0366	0.0013	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 7.0)	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0286	0.0069	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0232	0.0109	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0090	0.0044	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0065	0.0003	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0366	0.0280	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0031	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3868	N/A	N/A	92.1300	0.0988	0.0134	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.8499	N/A	N/A	66.9208	0.7506	0.9348	91.21	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0366	0.0014	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 8.5)	Sep	59.98	52.93	67.04	51.98	4.3252	N/A	N/A	68.0000			92.00	Option 4: RVP=8.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0083	0.0001	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0286	0.0053	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0232	0.0085	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0090	0.0034	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0366	0.0219	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0025	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.3300	N/A	N/A	92.1300	0.0988	0.0102	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4906	N/A	N/A	67.1750	0.7506	0.9494	91.21	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0366	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 10.5)	Oct	54.07	48.01	60.13	51.98	4.8783	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0286	0.0041	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0232	0.0065	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0090	0.0026	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0065	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0366	0.0171	86.17	Option 2: A=6.876, B=1171.17, C=224.41

Naphthalene						0.0019	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2738	N/A	N/A	92.1300	0.0988	0.0077	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.2552	N/A	N/A	65.3287	0.7506	0.9609	91.21	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0366	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 11.5)	Nov	48.04	43.61	52.46	51.98	4.8014	N/A	N/A	65.0000			92.00	Option 4: RVP=11.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0286	0.0035	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0232	0.0057	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0090	0.0023	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0366	0.0150	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0014	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.2250	N/A	N/A	92.1300	0.0988	0.0066	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.1839	N/A	N/A	64.4059	0.7506	0.9662	91.21	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0366	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
PUL Gasoline (RVP 14.0)	Dec	42.89	39.34	46.44	51.98	5.4421	N/A	N/A	61.0000			92.00	Option 4: RVP=14, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0083	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0286	0.0028	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0232	0.0046	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0090	0.0019	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0065	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0366	0.0122	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Naphthalene						0.0011	N/A	N/A	128.2000	0.0019	0.0000	128.20	Option 2: A=7.3729, B=1968.36, C=222.61
Toluene						0.1895	N/A	N/A	92.1300	0.0988	0.0052	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						7.0526	N/A	N/A	60.4771	0.7506	0.9727	91.21	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0366	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 330 - External Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	338.3596	405.1345	272.1740	285.5501	400.6990	415.8277	424.5809	385.1027	405.4839	418.3738	373.2149	385.7360
Seal Factor A (lb-mole/ft-yr):	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000	1.1000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000	7.6000
Seal-related Wind Speed Exponent:	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000	1.5000
Value of Vapor Pressure Function:	0.1227	0.1331	0.0680	0.0684	0.0987	0.1024	0.1031	0.0910	0.1043	0.1213	0.1188	0.1398
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	5.2428	3.0156	3.0306	4.1357	4.2629	4.2864	3.8659	4.3252	4.8783	4.8014	5.4421
Tank Diameter (ft):	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	61.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852	19.4852
Net Throughput (gal/mo.):	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000	7,593,642.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000	73.5000
Roof Fitting Losses (lb):	692.1036	865.3513	628.1062	670.7384	930.2401	965.3620	991.5133	909.8136	924.4635	918.1312	791.6276	794.9166
Value of Vapor Pressure Function:	0.1227	0.1331	0.0680	0.0684	0.0987	0.1024	0.1031	0.0910	0.1043	0.1213	0.1188	0.1398
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	61.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	1,091.7643	1,258.4410	1,629.7571	1,730.4987	1,662.9859	1,662.9859	1,696.5664	1,764.7827	1,564.3548	1,376.5877	1,229.7831	1,118.6654
Average Wind Speed (mph):	7.5000	8.1000	9.3000	9.6000	9.4000	9.4000	9.5000	9.7000	9.1000	8.5000	8.0000	7.6000
Total Losses (lb):	1,049.9484	1,289.9710	919.7654	975.7737	1,350.4243	1,400.6749	1,435.5794	1,314.4014	1,349.4325	1,355.9901	1,184.3277	1,200.1378

Roof Fitting/Status	Quantity	Roof Fitting Loss Factors		m	Losses(lb)
		KFa(lb-mole/yr)	KFb(lb-mole/(yr mph <sup>n</sup> n))		
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00	0.38	264.1177
Roof Leg (3-in. Diameter)/Adjustable, Double-Deck Roofs	10	0.82	0.53	0.14	104.2546
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	11.1034
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	9,583.3625
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20	0.94	88.5780
Rim Vent (6-in. Diameter)/Weighted Mech. Actuation, Gask.	1	0.71	0.10	1.00	9.1591
Roof Drain (3-in. Diameter)/90% Closed	1	1.80	0.14	1.10	19.5935

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**330 - External Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
PUL Gasoline (RVP 10.5)	418.37	19.49	918.13	0.00	1,355.99
1,2,4-Trimethylbenzene	0.02	0.16	0.03	0.00	0.21
2,2,4-Trimethylpentane (isooctane)	1.71	0.56	3.75	0.00	6.02
Benzene	2.74	0.45	6.00	0.00	9.19
Cyclohexane	1.11	0.17	2.43	0.00	3.71
Ethylbenzene	0.07	0.13	0.15	0.00	0.34
Hexane (-n)	7.15	0.71	15.70	0.00	23.57
Naphthalene	0.00	0.04	0.00	0.00	0.04
Toluene	3.23	1.93	7.10	0.00	12.26
Unidentified Components	402.03	14.63	882.26	0.00	1,298.92
Xylenes (mixed isomers)	0.32	0.71	0.70	0.00	1.73
PUL Gasoline (RVP 11.5)	373.21	19.49	791.63	0.00	1,184.33
1,2,4-Trimethylbenzene	0.01	0.16	0.02	0.00	0.20
2,2,4-Trimethylpentane (isooctane)	1.31	0.56	2.78	0.00	4.65
Benzene	2.11	0.45	4.49	0.00	7.05
Cyclohexane	0.86	0.17	1.82	0.00	2.85
Ethylbenzene	0.05	0.13	0.11	0.00	0.28
Hexane (-n)	5.59	0.71	11.86	0.00	18.16
Naphthalene	0.00	0.04	0.00	0.00	0.04
Toluene	2.45	1.93	5.19	0.00	9.56
Unidentified Components	360.60	14.63	764.86	0.00	1,140.08
Xylenes (mixed isomers)	0.24	0.71	0.50	0.00	1.45
PUL Gasoline (RVP 13.0)	743.49	38.97	1,557.45	0.00	2,339.92
1,2,4-Trimethylbenzene	0.02	0.32	0.04	0.00	0.38

2,2,4-Trimethylpentane (isooctane)	2.28	1.11	4.77	0.00	8.16
Benzene	3.68	0.90	7.72	0.00	12.30
Cyclohexane	1.50	0.35	3.14	0.00	4.99
Ethylbenzene	0.09	0.25	0.18	0.00	0.52
Hexane (-n)	9.81	1.43	20.56	0.00	31.79
Naphthalene	0.00	0.08	0.00	0.00	0.08
Toluene	4.20	3.85	8.80	0.00	16.85
Unidentified Components	721.53	29.25	1,511.42	0.00	2,262.20
Xylenes (mixed isomers)	0.40	1.43	0.83	0.00	2.66
PUL Gasoline (RVP 14.0)	385.74	19.49	794.92	0.00	1,200.14
1,2,4-Trimethylbenzene	0.01	0.16	0.02	0.00	0.19
2,2,4-Trimethylpentane (isooctane)	1.09	0.56	2.24	0.00	3.89
Benzene	1.76	0.45	3.63	0.00	5.85
Cyclohexane	0.72	0.17	1.48	0.00	2.37
Ethylbenzene	0.04	0.13	0.08	0.00	0.25
Hexane (-n)	4.71	0.71	9.70	0.00	15.12
Naphthalene	0.00	0.04	0.00	0.00	0.04
Toluene	2.00	1.93	4.13	0.00	8.05
Unidentified Components	375.22	14.63	773.25	0.00	1,163.09
Xylenes (mixed isomers)	0.19	0.71	0.39	0.00	1.29
PUL Gasoline (RVP 7.0)	670.65	38.97	1,580.55	0.00	2,290.18
1,2,4-Trimethylbenzene	0.04	0.32	0.10	0.00	0.47
2,2,4-Trimethylpentane (isooctane)	4.43	1.11	10.45	0.00	16.00
Benzene	7.05	0.90	16.61	0.00	24.55
Cyclohexane	2.83	0.35	6.68	0.00	9.86
Ethylbenzene	0.18	0.25	0.43	0.00	0.87
Hexane (-n)	18.22	1.43	42.95	0.00	62.60
Naphthalene	0.00	0.08	0.00	0.00	0.08
Toluene	8.51	3.85	20.06	0.00	32.42
Unidentified Components	628.51	29.25	1,481.22	0.00	2,138.99
Xylenes (mixed isomers)	0.86	1.43	2.04	0.00	4.32
PUL Gasoline (RVP 7.5)	696.75	38.97	1,619.62	0.00	2,355.34
1,2,4-Trimethylbenzene	0.04	0.32	0.10	0.00	0.47
2,2,4-Trimethylpentane (isooctane)	4.26	1.11	9.90	0.00	15.27
Benzene	6.76	0.90	15.73	0.00	23.39
Cyclohexane	2.72	0.35	6.33	0.00	9.40
Ethylbenzene	0.18	0.25	0.41	0.00	0.84

	17.50	1.43	40.69	0.00	59.62
Naphthalene	0.00	0.08	0.00	0.00	0.08
Toluene	8.17	3.85	19.00	0.00	31.02
Unidentified Components	656.29	29.25	1,525.53	0.00	2,211.08
Xylenes (mixed isomers)	0.83	1.43	1.93	0.00	4.18
PUL Gasoline (RVP 8.0)	415.83	19.49	965.36	0.00	1,400.67
1,2,4-Trimethylbenzene	0.02	0.16	0.06	0.00	0.24
2,2,4-Trimethylpentane (isooctane)	2.42	0.56	5.62	0.00	8.60
Benzene	3.84	0.45	8.91	0.00	13.20
Cyclohexane	1.54	0.17	3.58	0.00	5.30
Ethylbenzene	0.10	0.13	0.24	0.00	0.46
Hexane (-n)	9.89	0.71	22.96	0.00	33.56
Naphthalene	0.00	0.04	0.00	0.00	0.04
Toluene	4.67	1.93	10.85	0.00	17.45
Unidentified Components	392.85	14.63	912.03	0.00	1,319.51
Xylenes (mixed isomers)	0.48	0.71	1.11	0.00	2.30
PUL Gasoline (RVP 8.5)	806.18	38.97	1,854.70	0.00	2,699.86
1,2,4-Trimethylbenzene	0.04	0.32	0.10	0.00	0.46
2,2,4-Trimethylpentane (isooctane)	4.25	1.11	9.77	0.00	15.12
Benzene	6.76	0.90	15.54	0.00	23.20
Cyclohexane	2.72	0.35	6.26	0.00	9.33
Ethylbenzene	0.17	0.25	0.40	0.00	0.83
Hexane (-n)	17.52	1.43	40.30	0.00	59.24
Naphthalene	0.00	0.08	0.00	0.00	0.08
Toluene	8.12	3.85	18.68	0.00	30.66
Unidentified Components	765.79	29.25	1,761.78	0.00	2,556.81
Xylenes (mixed isomers)	0.82	1.43	1.88	0.00	4.13

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	331
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Alky / DAN

**Tank Dimensions**

Diameter (ft):		86.00
Volume (gallons):		1,260,000.00
Turnovers:		97.27
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		2.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition:	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal:	Rim-mounted

**Deck Characteristics**

Deck Fitting Category:	Detail
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1
Roof Leg or Hanger Well/Fixed	20
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	59
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1

Meteorological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Liquid Contents of Storage Tank

#### 331 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight.	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Alkylate	Jan	42.19	38.38	46.01	51.98	2.0157	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.1566	0.0432	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.1850	N/A	N/A	92.1300	0.0612	0.0089	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.5116	N/A	N/A	67.6203	0.7823	0.9479	110.86	
Alkylate	Feb	45.35	40.84	49.87	51.98	2.1617	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.1566	0.0444	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2058	N/A	N/A	92.1300	0.0612	0.0093	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.6908	N/A	N/A	67.5776	0.7823	0.9463	110.86	
Alkylate	Mar	49.25	43.96	54.55	51.98	2.3537	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.1566	0.0460	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2342	N/A	N/A	92.1300	0.0612	0.0097	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.9260	N/A	N/A	67.5244	0.7823	0.9443	110.86	
Alkylate	Apr	53.24	46.98	59.49	51.98	2.5641	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.1566	0.0476	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2665	N/A	N/A	92.1300	0.0612	0.0101	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.1832	N/A	N/A	67.4695	0.7823	0.9423	110.86	
Alkylate	May	57.74	50.54	64.93	51.98	2.8200	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.1566	0.0494	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3076	N/A	N/A	92.1300	0.0612	0.0106	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.4957	N/A	N/A	67.4067	0.7823	0.9400	110.86	
Alkylate	Jun	62.65	54.94	70.36	51.98	3.1229	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.1566	0.0514	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3584	N/A	N/A	92.1300	0.0612	0.0112	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8646	N/A	N/A	67.3375	0.7823	0.9375	110.86	
Alkylate	Jul	66.53	58.63	74.43	51.98	3.3803	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.1566	0.0529	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.4034	N/A	N/A	92.1300	0.0612	0.0116	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1775	N/A	N/A	67.2823	0.7823	0.9354	110.86	
Alkylate	Aug	65.15	57.72	72.57	51.98	3.2865	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.1566	0.0524	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3868	N/A	N/A	92.1300	0.0612	0.0115	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.0636	N/A	N/A	67.3020	0.7823	0.9362	110.86	
Alkylate	Sep	59.98	52.93	67.04	51.98	2.9554	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.1566	0.0503	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.3300	N/A	N/A	92.1300	0.0612	0.0109	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.6607	N/A	N/A	67.3751	0.7823	0.9388	110.86	
Alkylate	Oct	54.07	48.01	60.13	51.98	2.6101	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.1566	0.0479	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2738	N/A	N/A	92.1300	0.0612	0.0102	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.2395	N/A	N/A	67.4579	0.7823	0.9419	110.86	
Alkylate	Nov	48.04	43.61	52.46	51.98	2.2925	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3



2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.1566	0.0455	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.2250	N/A	N/A	92.1300	0.0612	0.0096	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.8510	N/A	N/A	67.5410	0.7823	0.9449	110.86	
Alkylate	Dec	42.89	39.34	46.44	51.98	2.0474	N/A	N/A	69.0000			110.00	Option 4: RVP=6.04, ASTM Slope=3
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.1566	0.0434	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Toluene						0.1895	N/A	N/A	92.1300	0.0612	0.0090	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						2.5505	N/A	N/A	67.6108	0.7823	0.9475	110.86	

## TANKS 4.0.9d

### Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 331 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	12.8733	13.8975	15.2654	16.7928	18.6937	21.0058	23.0276	22.2853	19.7189	17.1314	14.8264	13.0943
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Value of Vapor Pressure Function:	0.0434	0.0468	0.0515	0.0566	0.0630	0.0708	0.0776	0.0751	0.0665	0.0577	0.0500	0.0441
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	2.0157	2.1617	2.3537	2.5641	2.8200	3.1229	3.3803	3.2865	2.9554	2.6101	2.2925	2.0474
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938	26.1938
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000	10,213,612.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000	6.4000
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Deck Fitting Losses (lb):	56.2084	60.6802	66.6531	73.3222	81.6217	91.7174	100.5448	97.3037	86.0983	74.8007	64.7362	57.1733
Value of Vapor Pressure Function:	0.0434	0.0468	0.0515	0.0566	0.0630	0.0708	0.0776	0.0751	0.0665	0.0577	0.0500	0.0441
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000	225.3000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000	86.0000
Vapor Molecular Weight (lb/lb-mole):	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000	69.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	95.2756	100.7715	108.1123	116.3088	126.5092	138.9170	149.7662	145.7828	132.0111	118.1259	105.7565	96.4614

Roof Fitting/Status	Quantity	KF <sub>a</sub> (lb-mole/yr)	Roof Fitting Loss Factors		m	Losses(lb)
			KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))			
Column Well (24-in. Diam.)/Pipe Col.-Sliding Cover, Gask.	1	25.00	0.00		0.00	101.1938
Ladder Well (36-in. Diam.)/Sliding Cover, Ungasketed	1	76.00	0.00		0.00	307.6293
Roof Leg or Hanger Well/Fixed	20	0.00	0.00		0.00	0.0000
Vacuum Breaker (10-in. Diam.)/Weighted Mech. Actuation, Gask.	1	6.20	1.20		0.94	25.0961
Automatic Gauge Float Well/Unbolted Cover, Gasketed	1	4.30	17.00		0.38	17.4053
Access Hatch (24-in. Diam.)/Unbolted Cover, Gasketed	1	31.00	5.20		1.30	125.4804
Stub Drain (1-inch diameter)/Stub Drain (1-inch diameter)	59	1.20	0.00		0.00	286.5810
Sample Pipe or Well (24-in. Diam.)/Slit Fabric Seal 10% Open	1	12.00	0.00		0.00	48.5730

## TANKS 4.0.9d

**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**331 - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Alkylate	208.61	314.33	910.86	0.00	1,433.80
2,2,4-Trimethylpentane (isooctane)	10.12	49.21	44.17	0.00	103.50
Toluene	2.17	19.22	9.47	0.00	30.86
Unidentified Components	196.33	245.90	857.21	0.00	1,299.44

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	503
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Ethanol

**Tank Dimensions**

Diameter (ft):		38.00
Volume (gallons):		300,000.00
Turnovers:		162.02
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		2.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Characteristics**

Deck Fitting Category:	Detail
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format

## Liquid Contents of Storage Tank

### 503 - Internal Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
Denatured Fuel Ethanol	Jan	42.19	38.38	46.01	51.98	1.2435	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Feb	45.35	40.84	49.87	51.98	1.3387	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Mar	49.25	43.96	54.55	51.98	1.4644	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Apr	53.24	46.98	59.49	51.98	1.6027	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	May	57.74	50.54	64.93	51.98	1.7719	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Jun	62.65	54.94	70.36	51.98	1.9731	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Jul	66.53	58.63	74.43	51.98	2.1450	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Aug	65.15	57.72	72.57	51.98	2.0824	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Sep	59.98	52.93	67.04	51.98	1.8617	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Oct	54.07	48.01	60.13	51.98	1.6331	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Nov	48.04	43.61	52.46	51.98	1.4243	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3
Denatured Fuel Ethanol	Dec	42.89	39.34	46.44	51.98	1.2641	N/A	N/A	46.9500			46.95	Option 4: RVP=3.99, ASTM Slope=3

# **TANKS 4.0.9d** **Emissions Report - Detail Format** **Detail Calculations (AP-42)**

## **503 - Internal Floating Roof Tank** **Salt Lake City, Utah**

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	2.3083	2.4951	2.7443	3.0216	3.3655	3.7815	4.1429	4.0105	3.5503	3.0830	2.6644	2.3486
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Value of Vapor Pressure Function:	0.0259	0.0280	0.0308	0.0339	0.0377	0.0424	0.0464	0.0450	0.0398	0.0346	0.0299	0.0263
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	1.2435	1.3387	1.4644	1.6027	1.7719	1.9731	2.1450	2.0824	1.8617	1.6331	1.4243	1.2641
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821	24.8821
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500	4,050,569.2500
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845	6.5845
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Deck Fitting Losses (lb):	8.9699	9.6961	10.6641	11.7420	13.0782	14.6947	16.0993	15.5846	13.7963	11.9805	10.3537	9.1267
Value of Vapor Pressure Function:	0.0259	0.0280	0.0308	0.0339	0.0377	0.0424	0.0464	0.0450	0.0398	0.0346	0.0299	0.0263
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000	88.6000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000	38.0000
Vapor Molecular Weight (lb/lb-mole):	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500	46.9500
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	36.1603	37.0733	38.2905	39.6457	41.3258	43.3583	45.1243	44.4772	42.2287	39.9456	37.9002	36.3574
Roof Fitting/Status	<div> <div>Quantity</div> <div>KFa(lb-mole/yr)</div> <div>Roof Fitting Loss Factors KFb(lb-mole/(yr mph<sup>n</sup>))</div> <div>m</div> <div>Losses(lb)</div> </div>											
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00	0.00	2.6359							
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00	0.00	92.2562							
Slotted Guide-Pole/Sample Well/Gask. Sliding Cover, w. Float	1	31.00	36.00	2.00	51.0704							

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**503 - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawl Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
Denatured Fuel Ethanol	37.52	298.59	145.79	0.00	481.89

## TANKS 4.0.9d

### Emissions Report - Detail Format

#### Tank Identification and Physical Characteristics

**Identification**

User Identification:	504
City:	Salt Lake City
State:	Utah
Company:	
Type of Tank:	Internal Floating Roof Tank
Description:	Gasoline-ULR85SUM

**Tank Dimensions**

Diameter (ft):		50.00
Volume (gallons):		590,000.00
Turnovers:		823.84
Self Supp. Roof? (y/n):	N	
No. of Columns:		1.00
Eff. Col. Diam. (ft):		2.00

**Paint Characteristics**

Internal Shell Condition:	Light Rust
Shell Color/Shade:	White/White
Shell Condition	Good
Roof Color/Shade:	White/White
Roof Condition:	Good

**Rim-Seal System**

Primary Seal:	Mechanical Shoe
Secondary Seal	Rim-mounted

**Deck Characteristics**

Deck Fitting Category:	Detail
Deck Type:	Welded

**Deck Fitting/Status****Quantity**

Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1
Slotted Guide-Pole/Sample Well/Gask Sliding Covr, w. Float,Sleeve,Wiper	1

Meterological Data used in Emissions Calculations: Salt Lake City, Utah (Avg Atmospheric Pressure = 12.64 psia)

## TANKS 4.0.9d

### Emissions Report - Detail Format



## Liquid Contents of Storage Tank

### 504 - Internal Floating Roof Tank Salt Lake City, Utah

Mixture/Component	Month	Daily Liquid Surf. Temperature (deg F)			Liquid Bulk Temp (deg F)	Vapor Pressure (psia)			Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
		Avg.	Min.	Max.		Avg.	Min.	Max.					
RUL Gasoline (RVP 13.0)	Jan	42.19	38.38	46.01	51.98	4.9232	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0097	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3487	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.6975	N/A	N/A	78.1100	0.0201	0.0042	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7324	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0568	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.1802	N/A	N/A	86.1700	0.0429	0.0152	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1850	N/A	N/A	92.1300	0.0554	0.0031	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.8953	N/A	N/A	61.5096	0.8187	0.9726	92.00	
Xylenes (mixed isomers)						0.0470	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 13.0)	Feb	45.35	40.84	49.87	51.98	5.2428	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0111	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3847	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7668	N/A	N/A	78.1100	0.0201	0.0044	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8033	N/A	N/A	84.1600	0.0140	0.0032	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0640	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2897	N/A	N/A	86.1700	0.0429	0.0156	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2058	N/A	N/A	92.1300	0.0554	0.0032	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						6.2741	N/A	N/A	61.4939	0.8187	0.9718	92.00	
Xylenes (mixed isomers)						0.0530	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.5)	Mar	49.25	43.96	54.55	51.98	4.4323	N/A	N/A	66.0000			92.00	Option 4: RVP=10.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0131	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4335	N/A	N/A	114.2300	0.0120	0.0016	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8602	N/A	N/A	78.1100	0.0201	0.0054	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8987	N/A	N/A	84.1600	0.0140	0.0040	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0739	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.4364	N/A	N/A	86.1700	0.0429	0.0194	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2342	N/A	N/A	92.1300	0.0554	0.0041	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.2686	N/A	N/A	65.4349	0.8187	0.9649	92.00	
Xylenes (mixed isomers)						0.0613	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.0)	Apr	53.24	46.98	59.49	51.98	3.5258	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0155	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4886	N/A	N/A	114.2300	0.0120	0.0023	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9652	N/A	N/A	78.1100	0.0201	0.0074	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0056	N/A	N/A	84.1600	0.0140	0.0054	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0854	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6001	N/A	N/A	86.1700	0.0429	0.0263	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2665	N/A	N/A	92.1300	0.0554	0.0057	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.1440	N/A	N/A	67.2730	0.8187	0.9520	92.00	
Xylenes (mixed isomers)						0.0710	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	May	57.74	50.54	64.93	51.98	3.3270	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0187	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5579	N/A	N/A	114.2300	0.0120	0.0027	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.0964	N/A	N/A	78.1100	0.0201	0.0090	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.1390	N/A	N/A	84.1600	0.0140	0.0065	84.16	Option 2: A=6.841, B=1201.53, C=222.65

Ethylbenzene						0.1003	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.8034	N/A	N/A	86.1700	0.0429	0.0314	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3076	N/A	N/A	92.1300	0.0554	0.0069	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						3.8795	N/A	N/A	67.1184	0.8187	0.9423	92.00	
Xylenes (mixed isomers)						0.0834	N/A	N/A	106.1700	0.0279	0.0009	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Jun	62.65	54.94	70.36	51.98	3.6770	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0227	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6427	N/A	N/A	114.2300	0.0120	0.0028	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.2564	N/A	N/A	78.1100	0.0201	0.0093	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3010	N/A	N/A	84.1600	0.0140	0.0067	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1190	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.0492	N/A	N/A	86.1700	0.0429	0.0323	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3584	N/A	N/A	92.1300	0.0554	0.0073	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.2806	N/A	N/A	67.0850	0.8187	0.9403	92.00	
Xylenes (mixed isomers)						0.0991	N/A	N/A	106.1700	0.0279	0.0010	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Jul	66.53	58.63	74.43	51.98	3.9739	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0264	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.7170	N/A	N/A	114.2300	0.0120	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3960	N/A	N/A	78.1100	0.0201	0.0096	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.4421	N/A	N/A	84.1600	0.0140	0.0069	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1358	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.2621	N/A	N/A	86.1700	0.0429	0.0330	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.4034	N/A	N/A	92.1300	0.0554	0.0076	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.6203	N/A	N/A	67.0584	0.8187	0.9387	92.00	
Xylenes (mixed isomers)						0.1133	N/A	N/A	106.1700	0.0279	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 7.0)	Aug	65.15	57.72	72.57	51.98	3.8659	N/A	N/A	68.0000			92.00	Option 4: RVP=7, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0250	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.6897	N/A	N/A	114.2300	0.0120	0.0029	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.3448	N/A	N/A	78.1100	0.0201	0.0095	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.3904	N/A	N/A	84.1600	0.0140	0.0068	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1295	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						2.1842	N/A	N/A	86.1700	0.0429	0.0328	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3868	N/A	N/A	92.1300	0.0554	0.0075	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.4967	N/A	N/A	67.0679	0.8187	0.9393	92.00	
Xylenes (mixed isomers)						0.1081	N/A	N/A	106.1700	0.0279	0.0011	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 8.0)	Sep	59.98	52.93	67.04	51.98	4.0426	N/A	N/A	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0204	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5954	N/A	N/A	114.2300	0.0120	0.0024	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						1.1674	N/A	N/A	78.1100	0.0201	0.0079	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.2109	N/A	N/A	84.1600	0.0140	0.0057	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.1085	N/A	N/A	106.1700	0.0050	0.0002	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.9126	N/A	N/A	86.1700	0.0429	0.0274	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.3300	N/A	N/A	92.1300	0.0554	0.0061	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						4.7419	N/A	N/A	67.2323	0.8187	0.9495	92.00	
Xylenes (mixed isomers)						0.0903	N/A	N/A	106.1700	0.0279	0.0008	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 10.0)	Oct	54.07	48.01	60.13	51.98	4.6164	N/A	N/A	66.0000			92.00	Option 4: RVP=10, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0161	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.5009	N/A	N/A	114.2300	0.0120	0.0018	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.9885	N/A	N/A	78.1100	0.0201	0.0060	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						1.0294	N/A	N/A	84.1600	0.0140	0.0043	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0880	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.6364	N/A	N/A	86.1700	0.0429	0.0212	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2738	N/A	N/A	92.1300	0.0554	0.0046	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.4723	N/A	N/A	65.3754	0.8187	0.9613	92.00	
Xylenes (mixed isomers)						0.0732	N/A	N/A	106.1700	0.0279	0.0006	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 11.5)	Nov	48.04	43.61	52.46	51.98	4.8014	N/A	N/A	65.0000			92.00	Option 4: RVP=11.5, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0125	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.4178	N/A	N/A	114.2300	0.0120	0.0015	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.8301	N/A	N/A	78.1100	0.0201	0.0049	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.8680	N/A	N/A	84.1600	0.0140	0.0036	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0707	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21

Hexane (-n)						1.3893	N/A	N/A	86.1700	0.0429	0.0176	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.2250	N/A	N/A	92.1300	0.0554	0.0037	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.7245	N/A	N/A	64.4735	0.8187	0.9682	92.00	
Xylenes (mixed isomers)						0.0586	N/A	N/A	106.1700	0.0279	0.0005	106.17	Option 2: A=7.009, B=1462.266, C=215.11
RUL Gasoline (RVP 13.0)	Dec	42.89	39.34	46.44	51.98	4.9928	N/A	N/A	62.0000			92.00	Option 4: RVP=13, ASTM Slope=3
1,2,4-Trimethylbenzene						0.0100	N/A	N/A	120.1900	0.0040	0.0000	120.19	Option 2: A=7.04383, B=1573.267, C=208.56
2,2,4-Trimethylpentane (isooctane)						0.3564	N/A	N/A	114.2300	0.0120	0.0013	114.23	Option 2: A=6.8118, B=1257.84, C=220.74
Benzene						0.7124	N/A	N/A	78.1100	0.0201	0.0043	78.11	Option 2: A=6.905, B=1211.033, C=220.79
Cyclohexane						0.7477	N/A	N/A	84.1600	0.0140	0.0031	84.16	Option 2: A=6.841, B=1201.53, C=222.65
Ethylbenzene						0.0583	N/A	N/A	106.1700	0.0050	0.0001	106.17	Option 2: A=6.975, B=1424.255, C=213.21
Hexane (-n)						1.2038	N/A	N/A	86.1700	0.0429	0.0153	86.17	Option 2: A=6.876, B=1171.17, C=224.41
Toluene						0.1895	N/A	N/A	92.1300	0.0554	0.0031	92.13	Option 2: A=6.954, B=1344.8, C=219.48
Unidentified Components						5.9777	N/A	N/A	61.5061	0.8187	0.9724	92.00	
Xylenes (mixed isomers)						0.0483	N/A	N/A	106.1700	0.0279	0.0004	106.17	Option 2: A=7.009, B=1462.266, C=215.11

# TANKS 4.0.9d

## Emissions Report - Detail Format

### Detail Calculations (AP-42)

#### 504 - Internal Floating Roof Tank

#### Salt Lake City, Utah

Month:	January	February	March	April	May	June	July	August	September	October	November	December
Rim Seal Losses (lb):	19.0179	20.6291	17.7356	13.8627	12.9518	14.5684	15.9881	15.4662	16.3231	18.6595	19.3114	19.3630
Seal Factor A (lb-mole/ft-yr):	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000	0.6000
Seal Factor B (lb-mole/ft-yr (mph) <sup>n</sup> ):	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000	0.4000
Value of Vapor Pressure Function:	0.1227	0.1331	0.1075	0.0815	0.0762	0.0857	0.0940	0.0910	0.0960	0.1131	0.1188	0.1249
Vapor Pressure at Daily Average Liquid Surface Temperature (psia):	4.9232	5.2428	4.4323	3.5258	3.3270	3.6770	3.9739	3.8659	4.0426	4.6164	4.8014	4.9928
Tank Diameter (ft):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Withdrawal Losses (lb):	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990	158.8990
Number of Columns:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Effective Column Diameter (ft):	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000	2.0000
Net Throughput (gal/mo.):	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000	40,505,692.5000
Shell Clingage Factor (bbl/1000 sqft):	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Average Organic Liquid Density (lb/gal):	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000	5.6000
Tank Diameter (ft):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Deck Fitting Losses (lb):	43.4877	47.1719	40.5555	31.6993	29.6163	33.3130	36.5595	35.3659	37.3254	42.6680	44.1587	44.2767
Value of Vapor Pressure Function:	0.1227	0.1331	0.1075	0.0815	0.0762	0.0857	0.0940	0.0910	0.0960	0.1131	0.1188	0.1249
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Tot. Roof Fitting Loss Fact.(lb-mole/yr):	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000	68.6000
Deck Seam Losses (lb):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length (ft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Loss per Unit Length Factor (lb-mole/ft-yr):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Deck Seam Length Factor(ft/sqft):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tank Diameter (ft):	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000	50.0000
Vapor Molecular Weight (lb/lb-mole):	62.0000	62.0000	66.0000	68.0000	68.0000	68.0000	68.0000	68.0000	68.0000	66.0000	65.0000	62.0000
Product Factor:	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total Losses (lb):	221.4046	226.7000	217.1901	204.4610	201.4671	206.7804	211.4466	209.7311	212.5474	220.2265	222.3691	222.5387

Roof Fitting/Status	Quantity	KF <sub>a</sub> (lb-mole/yr)	Roof Fitting Loss Factors		m	Losses(lb)
			KF <sub>b</sub> (lb-mole/(yr mph <sup>n</sup> ))			
Access Hatch (24-in. Diam.)/Bolted Cover, Gasketed	1	1.60	0.00		0.00	10.8611
Ladder Well (36-in. Diam.)/Sliding Cover, Gasketed	1	56.00	0.00		0.00	380.1388
Slotted Guide-Pole/Sample Well/Gask Sliding Covr, w. Float,Sleeve,Wiper	1	11.00	9.90		0.89	74.6701

**TANKS 4.0.9d**  
**Emissions Report - Detail Format**  
**Individual Tank Emission Totals**

**Emissions Report for: January, February, March, April, May, June, July, August, September, October, November, December**

**504 - Internal Floating Roof Tank**  
**Salt Lake City, Utah**

	Losses(lbs)				
Components	Rim Seal Loss	Withdrawal Loss	Deck Fitting Loss	Deck Seam Loss	Total Emissions
RUL Gasoline (RVP 10.0)	18.66	158.90	42.67	0.00	220.23
1,2,4-Trimethylbenzene	0.00	0.64	0.00	0.00	0.64
2,2,4-Trimethylpentane (isooctane)	0.03	1.91	0.08	0.00	2.02
Benzene	0.11	3.19	0.26	0.00	3.56
Cyclohexane	0.08	2.22	0.19	0.00	2.49
Ethylbenzene	0.00	0.79	0.01	0.00	0.79
Hexane (-n)	0.40	6.81	0.90	0.00	8.11
Toluene	0.09	8.81	0.20	0.00	9.09
Unidentified Components	17.94	130.10	41.02	0.00	189.05
Xylenes (mixed isomers)	0.01	4.44	0.03	0.00	4.48
RUL Gasoline (RVP 10.5)	17.74	158.90	40.56	0.00	217.19
1,2,4-Trimethylbenzene	0.00	0.64	0.00	0.00	0.64
2,2,4-Trimethylpentane (isooctane)	0.03	1.91	0.07	0.00	2.00
Benzene	0.10	3.19	0.22	0.00	3.51
Cyclohexane	0.07	2.22	0.16	0.00	2.45
Ethylbenzene	0.00	0.79	0.00	0.00	0.79
Hexane (-n)	0.34	6.81	0.79	0.00	7.94
Toluene	0.07	8.81	0.17	0.00	9.05
Unidentified Components	17.11	130.10	39.13	0.00	186.34
Xylenes (mixed isomers)	0.01	4.44	0.02	0.00	4.47
RUL Gasoline (RVP 11.5)	19.31	158.90	44.16	0.00	222.37
1,2,4-Trimethylbenzene	0.00	0.64	0.00	0.00	0.64
2,2,4-Trimethylpentane (isooctane)	0.03	1.91	0.07	0.00	2.00
Benzene	0.09	3.19	0.22	0.00	3.51

Cyclohexane	0.07	2.22	0.16	0.00	2.45
Ethylbenzene	0.00	0.79	0.00	0.00	0.79
Hexane (-n)	0.34	6.81	0.78	0.00	7.93
Toluene	0.07	8.81	0.16	0.00	9.04
Unidentified Components	18.70	130.10	42.75	0.00	191.55
Xylenes (mixed isomers)	0.01	4.44	0.02	0.00	4.47
RUL Gasoline (RVP 13.0)	59.01	476.70	134.94	0.00	670.64
1,2,4-Trimethylbenzene	0.00	1.91	0.00	0.00	1.91
2,2,4-Trimethylpentane (isooctane)	0.08	5.72	0.17	0.00	5.97
Benzene	0.25	9.58	0.58	0.00	10.41
Cyclohexane	0.18	6.66	0.42	0.00	7.27
Ethylbenzene	0.01	2.36	0.01	0.00	2.38
Hexane (-n)	0.91	20.44	2.08	0.00	23.43
Toluene	0.19	26.42	0.42	0.00	27.03
Unidentified Components	57.37	390.29	131.19	0.00	578.85
Xylenes (mixed isomers)	0.02	13.31	0.05	0.00	13.39
RUL Gasoline (RVP 7.0)	58.97	635.60	134.85	0.00	829.43
1,2,4-Trimethylbenzene	0.00	2.54	0.00	0.00	2.55
2,2,4-Trimethylpentane (isooctane)	0.17	7.63	0.38	0.00	8.18
Benzene	0.55	12.78	1.26	0.00	14.58
Cyclohexane	0.40	8.89	0.91	0.00	10.19
Ethylbenzene	0.01	3.15	0.03	0.00	3.19
Hexane (-n)	1.91	27.25	4.37	0.00	33.53
Toluene	0.43	35.23	0.99	0.00	36.66
Unidentified Components	55.44	520.39	126.77	0.00	702.59
Xylenes (mixed isomers)	0.06	17.75	0.14	0.00	17.95
RUL Gasoline (RVP 8.0)	30.19	317.80	69.02	0.00	417.01
1,2,4-Trimethylbenzene	0.00	1.27	0.00	0.00	1.27
2,2,4-Trimethylpentane (isooctane)	0.07	3.81	0.16	0.00	4.04
Benzene	0.23	6.39	0.53	0.00	7.15
Cyclohexane	0.17	4.44	0.38	0.00	4.99
Ethylbenzene	0.01	1.57	0.01	0.00	1.59
Hexane (-n)	0.81	13.62	1.86	0.00	16.30
Toluene	0.18	17.62	0.41	0.00	18.20
Unidentified Components	28.70	260.19	65.62	0.00	354.51
Xylenes (mixed isomers)	0.02	8.88	0.06	0.00	8.96

## **Attachment C**

### **EPA Guidance on NSR Project Aggregation**

Prior to 2006, EPA's aggregation policy was not spelled out but involved the application of "common sense factors to determine the relatedness of projects for purposes of aggregation." The policy had evolved in large part based on "specific, case-by-case after-the-fact inquiries related to the possible circumvention of NSR in existing permits."<sup>28</sup>

In 2006, EPA announced its intention to promulgate a rule on aggregation that would clarify the previous policy.<sup>29</sup> The rule would have EPA aggregate projects only if they were not independent of each other. There would be no aggregation based on time. Specifically, the agency proposed that when a particular project is technically or economically dependent upon another project, the emissions resulting from each of the projects must be added together for purposes of determining NSR applicability.<sup>30</sup> The terms "technically dependent" and "technical dependence" describe the interrelationship between projects such that one project is incapable of performing as planned in the absence of the other project. This means that, absent another project, the process change cannot operate without significant impairment, or for the planned amount of hours, or at the planned rating or production level, or that it operates in a manner that results in a product of inferior quality. Activities are dependent on each other for their economic viability if the economic revenues or "Return on Investment" associated with the project could not be realized without the completion of another project. EPA proposed an approach that would require that a source treat one project as economically dependent on another if it is no longer economically viable without the completion of the other project(s).<sup>31</sup> Economic viability is measured by assessing the ROI or payback of a project, such that a project is not economically viable if it does not pay for itself (e.g., yield a positive expected rate of return) in the absence of another related project.

EPA finalized the aggregation rule in 2009 and it did not make any changes to the rule language relevant to aggregation, but interpreted that rule text to mean that sources and permitting authorities should combine emissions only when nominally separate changes are "substantially related."<sup>32</sup> EPA described in the final rule preamble the factors that may be considered when evaluating whether changes are substantially related, and specifically stated that two nominally-separate changes are not substantially related if they are only related to the extent that they both support the plant's overall

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<sup>28</sup> 71 Fed Reg 54244.

<sup>29</sup> 71 Fed Reg 54235.

<sup>30</sup> 71 Fed Reg 54245.

<sup>31</sup> 71 Fed Reg 54246.

<sup>32</sup> 74 Fed Reg 2376.



basic purpose. At the same time, EPA adopted a rebuttable presumption that nominally-separate changes at a source that occur three or more years apart are presumed to not be substantially related.<sup>33</sup>

On May 6, 2010 the EPA administrator signed a stay of effectiveness of the aggregation rule until the judicial review is completed or EPA completes its reconsideration process. Therefore, at this time the final aggregation rule remains stayed and EPA's prior policy related to aggregation/circumvention remains the effective basis for determination.

***Pre-2006 EPA Policy: 3M-Maplewood Memo.*** While numerous EPA opinion letters wove the fabric for EPA's "specific, case-by-case after-the-fact inquiries" on aggregation prior to 2006, EPA's opinion letter to 3M regarding the company's facility in Maplewood, Minnesota is often cited for its general statement of EPA's position on aggregation principles.<sup>34,35</sup> In the 3M-Maplewood Memo, EPA indicated that projects should be aggregated where standing alone, they are not economically or technically viable. EPA enumerated the following five criteria for evaluation of this issue:

- (1) Filing of more than one minor source or minor modification application associated with emissions increases at a single plant within a short time period.
- (2) Applications for commercial loans . . . to see if the source has treated the projects as one modification for financial purposes.
- (3) Reports of consumer demand and projected production levels.
- (4) Statements of authorized representatives of the source regarding plans for operation. And,
- (5) EPA's own analysis of the economic realities of the projects considered together.

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<sup>33</sup> 74 Fed Reg 2376.

<sup>34</sup> See "Applicability of New Source Review Circumvention Guidance to 3M-Maplewood, Minnesota" (EPA, June 17, 1993) ("3M-Maplewood Memo")

<sup>35</sup> In 3M's case, the company received four synthetic minor permits for modifications between October 1991 and March 1992, each project which 3M argued was decided for by "independent divisions" at the plant, and, further, that each project was "independently viable."

Most of these factors are aimed at evaluating the applicant's intent and the economic realities surrounding a project. For instance, where it appears obvious that a proposed source or modification, by its physical and operational design characteristics, could not economically be run at minor source levels for an appreciable length of time without modifications included in the second proposed project, aggregation may be appropriate.

EPA's policy statements in the context of the related issue of unlawful circumvention are also helpful in reviewing its interpretive approach to aggregation, and the importance that a source's intent, as established by objective indicia, occupies in the analysis:<sup>36</sup>

It is not possible to set forth, in detail, the circumstances in which EPA considers an owner or operator to have evaded preconstruction review . . . and thus subjected itself to enforcement sanctions under [Clean Air Act] sections 113 and 167 from the beginning of construction. This is ultimately a question of intent.

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<sup>36</sup> 54 Fed. Reg. 27,274, 27,274

## **Attachment D**

### **Letter from EPA Region 4**



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

REGION 4  
ATLANTA FEDERAL CENTER  
61 FORSYTH STREET  
ATLANTA, GEORGIA 30303-8960

**MAR 18 2010**

Mark Robinson  
Plant Manager  
Georgia-Pacific Wood Products LLC  
Highway 13 North  
Columbia, Mississippi 39429

Dear Mr. Robinson,

On December 1, 2009, the Mississippi Department of Environmental Quality (MDEQ) forwarded to the Environmental Protection Agency (EPA) your 502(b)(10) change request dated November 16, 2009. Please note that Mississippi regulations at APC-S-6 Section IV.F require that facilities provide EPA as well as MDEQ with written notification in advance of the proposed changes. In the future, you must provide EPA with a copy of any 502(b)(10) changes.

On December 2, 2009, EPA notified MDEQ via e-mail about concerns regarding Georgia Pacific's use of the "demand growth exclusion" in 40 CFR 52.21(b)(41)(ii)(c) and whether the "Vortex Burners" project qualified as a 502(b)(10) change. On December 14, 2009, representatives from Georgia Pacific met with EPA Region 4 to discuss the 502(b)(10) change request and provided additional information regarding the project.

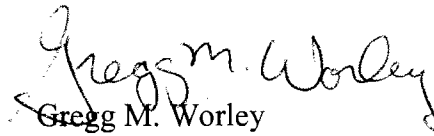
After further review and consideration, and contingent on the information submitted being accurate and complete, EPA acknowledges that Georgia Pacific's use of the "demand growth exclusion" for calculating applicability of the Prevention of Significant Deterioration (PSD) permitting requirements is adequate and the project does qualify as a 502(b)(10) change. However, we have some points of clarification regarding statements made on the 502(b)(10) change request letter.

We acknowledge that Georgia Pacific may use the highest demonstrated average monthly operating level during the baseline period as an approximation of the level of operation that the units "could have accommodated" during the baseline period. However, EPA disagrees with the statement that Georgia Pacific "...does not accept this as the limit on excludable emissions during the baseline..." and the statement that the excludable amount under the "demand growth exclusion" is "...the highest amount that the unit could have legally and physically emitted during the baseline..." For PSD applicability purposes, the concept of emissions that "could have been accommodated" is relevant only in conjunction with the source's calculation of "projected actual emissions." That is, once the projected actual emissions from the source following the proposed project have been determined, the source may exclude from the projection "that portion of the unit's emissions following the project that an existing unit could have

accommodated” during the baseline period, and “that are also unrelated to the particular project.” See 40 CFR 52.21(b)(41)(ii)(c). Accordingly, before any given emissions may be excluded under 40 CFR 52.21(b)(41)(ii)(c) on the basis that they result from future demand growth, those emissions must first be part of the projected actual emissions based on “all relevant information” [see e.g., 40 CFR 52.21(b)(41)(ii)(a)] used to make the emissions projection.

In summary, although we do not agree with some of the statements made by Georgia Pacific in the 502(b)(10) change request as explained above, based on the information submitted, we agree with Georgia Pacific’s use of the “demand growth exclusion” for determining PSD applicability for the “Vortex Burners” project. Since the “Vortex Burners” project is not considered a Title I modification, and does not exceed emissions allowable under the permit, the change qualifies as a 502(b)(10) change. If you have any questions, you may contact Heather Abrams at (404) 562-9185 or Yolanda Adams at (404) 562-9214.

Sincerely,

A handwritten signature in black ink, appearing to read "Gregg M. Worley". The signature is fluid and cursive, with the first name "Gregg" being more prominent.

Gregg M. Worley  
Chief  
Air Permits Section

Enclosures

1. Letter dated November 16, 2009
2. Example VOC Emissions for Kiln 2 and 3

cc: Mr. Scott Hodges – MDEQ  
Ms. Maria Zufall – Georgia-Pacific



#1639  
Georgia-Pacific Wood Products LLC  
Highway 13 North  
Columbia, Mississippi 39429  
Telephone (601) 736-7181

November 16, 2009

Mr. Scott Hodges  
Mississippi Department of Environmental Quality  
Environmental Permits Division  
P. O. Box 2261  
Jackson, MS 39225

**Re: Georgia-Pacific Wood Products LLC  
Columbia, MS Sawmill  
Facility No. 1740-00008**

Dear Mr. Hodges:

Georgia-Pacific Wood Products LLC owns and operates the Columbia, Mississippi Chip-N-Saw (CNS). The Columbia CNS (Facility No. 1740-00008) operates under a Title V Major Source Operating Permit issued by the Mississippi Department of Environmental Quality (MDEQ). The Columbia CNS is submitting this letter to notify MDEQ of a 502(b)(10) change for a project to install a vortex chamber system on Kiln No. 2. The Columbia CNS anticipates making this change to Kiln No. 2 on or about December 15, 2009. A 502(b)(10) notification was submitted to MDEQ in November 2008 for the Kiln No. 3 vortex chamber, and that work was completed in March of 2009. Since the time of the November 2008 submittal, additional information has been developed regarding the Kiln No. 3 vortex chamber. This letter addresses the vortex chambers for both kilns.

As described in this letter, the project (vortex chambers for both Kiln 2 and 3) is exempt from construction permitting requirements because it is a *de minimis* NSR modification as defined by Mississippi's "Permit Regulation for the Construction and/or Operation of Air Emissions Equipment (APC-S-2)." The project qualifies as a 502(b)(10) change under the operational flexibility provisions of Mississippi's Title V regulation (APC-S-6) because the project does not constitute a Title I modification, does not exceed an allowable emission rate, and does not violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements.

The remainder of this letter provides a brief description of the project and applicability of permitting and regulatory requirements.

RECEIVED  
NOV 24 2009  
Dept of Environmental Quality  
Office of Pollution Control

#### **PROJECT DESCRIPTION AND EMISSIONS CHANGES**

The Columbia CNS has three kilns that are heated by direct-fired dry shavings burners. The projects involve installing a secondary combustion "vortex" chamber on the burner for Kiln No. 2 and No. 3 to reduce energy costs and improve lumber quality. The additional combustion chamber also minimizes the risks of a kiln fire due to carryover. A 502(b)(10) letter for Kiln No. 3 was submitted to MDEQ in November 2008 and the vortex chamber was installed in March 2009. At the time of the November 2008 submittal, there was nothing in the project scope or engineering design to indicate that an increase in production could result from installation of the vortex chamber. Now that the plant has operated for a number of months with the vortex chamber on Kiln No. 3, it has been determined that the kiln cycle time can be reduced from an average of 19 hours to 17.5 hours by utilizing the retained heat in the vortex chamber if the lumber kiln is immediately re-loaded ("hot-charged"). Therefore, we have evaluated the emissions increase from reducing the cycle time for both Kiln Nos. 2 and 3.

For determining applicability of PSD permitting to the project, GP calculated emissions increases based on 40 CFR §52.21, which is incorporated by reference (with exceptions noted) in MDEQ regulation APC-S-5. Emissions increases (EI) for an existing unit are determined from:

$$EI = \text{Projected Actual Emissions (PAE)} - \text{Baseline Actual Emissions (BAE)}$$

The baseline actual emissions are based on emissions from 2004-2005, the highest two calendar years of production (and therefore emissions) in the past 10 years. Emissions are calculated using actual stack test data, NCASI, and EPA emission factors. Detailed calculations are included in the attachment to this letter.

For the modified units, Kiln Nos. 2 and 3, the projected actual emissions were estimated based on the highest monthly throughput (annualized) for the two kilns during the baseline period, 105,816 thousand board feet per year (Mbf/yr) plus the increased throughput due to decreased cycle time. The maximum monthly throughput (annualized) was used as a basis for the projected maximum emissions because future production is expected to be no greater than the existing maximum other than the change due to the vortex project. The increase due to cycle time change was calculated as a percent increase based on 19 hours before installation of the vortex chamber and 17.5 hours with the vortex chamber. The projected actual production for Kiln Nos. 2 and 3 is calculated as  $105,816 \text{ Mbf/yr} \times 19/17.5 = 114,886 \text{ Mbf/yr}$ .

Per 40 CFR §52.21(b)(41)(ii)(c), the projected actual emissions:

*Shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions under subparagraph (2)(iii) of this rule and that are not resulting from the particular project, including any increased utilization due to product demand growth;*

This provision is commonly called the "demand growth exclusion". The amount of excludable emissions is difficult to assess, and the rules contain no specific assessment guidance, but GP believes that the excludable amount essentially is the level of emissions that could be physically and legally accommodated by the unit during the baseline period, before (without) any increases caused by the physical or operational changes proposed in the project. The rules do not limit this excludable amount to the amount actually emitted (i.e., the highest demonstrated/documented level of emissions) during a given period within the baseline. Rather, it is the highest amount that the unit could have legally and physically emitted during the baseline, before the proposed project, if market demand had been sufficiently high to require that increased maximum level of production.

For convenience and simplicity only, GP used the highest demonstrated average monthly operating level<sup>1</sup> during the baseline period as an approximation of the level of operation that the Kiln Nos. 2 and 3 "could have accommodated" during the baseline period. Emissions that the unit could have accommodated during the baseline, including those caused by increased utilization stimulated by "demand growth", are subtracted from the calculated projected actual emissions.

As the kilns are typically the production bottleneck at the facility, emissions increases from affected sources were also calculated for all process emission units with the exception of Kiln No. 1. To determine the impact of the additional board production (9,070 Mbf/yr), the increase in Mbf was converted to increases in hours, log, and truck throughput based on ratio of Mbf to each production parameter during the baseline period.

Based on the methodology described above, the following emission increases are calculated for the vortex chamber projects, demonstrating that neither PSD nor state permitting is required for any pollutant.

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<sup>1</sup> The 30-day period as a demonstration of "could have accommodated" emissions has been presented by EPA Region 4 as an acceptable approximation (Southern Section AWMA Presentation by Jim Little, August 22, 2006). GP does not accept this as the limit on excludable emissions during the baseline as there are no such limits in the rule, but uses it here for convenience because it seems to be an accepted, demonstrated approach.



**Table 1. Emissions Increase due to Vortex Burners**

	PM (tpy)	PM <sub>10</sub> (tpy)	PM <sub>2.5</sub> (tpy)	NO <sub>x</sub> (tpy)	CO (tpy)	VOC (tpy)	SO <sub>2</sub> (tpy)
<b>Kiln 2 and 3</b>							
A. Baseline	34.0	34.0	34.0	19.9	83.6	211.6	3.0
B. Capable of Accommodating	41.3	41.3	41.3	24.2	101.6	257.1	3.6
C. Projected Actual	44.8	44.8	44.8	26.3	110.3	279.2	3.9
D. Demand Growth (D - B - A)	7.3	7.3	7.3	4.3	18.0	45.5	0.6
E. Emission Increase (E - C - A - D)	3.5	3.5	3.5	2.1	8.7	22.0	0.3
<b>Affected Sources - Incremental Increase</b>	8.3	3.2	1.6				
<b>Project Increase</b>	11.8	6.8	5.1	2.1	8.7	22.0	0.3
<b>PSD SER</b>	25	15	10	40	100	40	40
<b>Exceeds?</b>	No	No	No	No	No	No	No
<b>MDEQ De Minimis</b>	18.8	11.3	7.5	30.0	75.0	30.0	30.0
<b>Exceeds?</b>	No	No	No	No	No	No	No

#### REGULATORY APPLICABILITY ANALYSIS

There are no New Source Performance Standards (NSPS) that specifically apply to sawmills. In addition, no emission units proposed for modification are defined as affected facilities under any NSPS. Therefore, no NSPS apply to this project.

A National Emissions Standard for Hazardous Air Pollutants (NESHAP) for the plywood and composite wood products (PCWP) source category, commonly known as the PCWP MACT, was initially finalized by U.S. EPA on July 30, 2004 and was reissued and amended after reconsideration on February 16, 2006. The rule was partially vacated and remanded by the D.C. Circuit Court of Appeals in June 2007. Lumber kilns are process units within the "affected source" under the PCWP MACT. However, there are no applicable control requirements or work practice standards. Therefore, GP was only required to submit an initial notification as required under NESHAP Subpart A (40 CFR §63.9). No other emission units proposed for modification are process units within the affected source under the PCWP MACT.

The equipment at the Columbia CNS will continue to be operated in compliance with applicable requirements of Mississippi's "Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants (APC-S-1)." There is no change to the applicability or requirements of these regulations as a result of the vortex chamber projects.

#### PERMITTING APPLICABILITY ANALYSIS

The Columbia CNS's current Title V Operating Permit limits the kilns to 160,000 Mbf/yr (combined), 2.4 lbs of sulfur dioxide (SO<sub>2</sub>) per MMBtu and firing of woodwaste only. The CNS will continue to meet these requirements after the proposed project. Therefore,

the installation of the vortex chamber will not result in an exceedance of an allowable emission rate, violate applicable requirements, or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements.

Regulation APC-S-2 describes requirements for construction permits. The emissions increases from the proposed project are shown in Table --. The increases were compared to both the Prevention of Significant Deterioration (PSD) significant emission rates (SER) and MDEQ's *de minimis* modification threshold (equal to 75% of the PSD SER). The project emission increases are below both the major modification thresholds and the *de minimis* thresholds. Therefore, the project is not a major modification, does not require an emissions netting analysis, and is not a moderate (i.e., synthetic minor) modification. Section XIII(F) provides that "a *de minimis* NSR modification is excluded from the requirements for a permit to construct. This does not eliminate any requirement for modification of Title V permits or permits to operate for *de minimis* modifications."

The Columbia CNS permit has an existing requirement to (Condition 5.B.1) to record the lumber throughput on a daily and rolling 365-day basis and is required to report annual facility-wide emissions per Condition 1.7. As such the Columbia CNS requests that the existing monitoring requirements be accepted as meeting the recordkeeping requirements of 52.21(r)(6).

Regulation APC-S-6 describes requirements for Title V operating permits. Section IV.F of this regulation addresses changes that may be made without requiring a permit revision. These changes are commonly referred to as "operational flexibility" or 502(b)(10) changes that "are not modifications under any provision of Title I of the Act and the changes do not exceed the emissions allowable under the permit." This project meets these criteria as described in this letter because the project is not a major modification with respect to PSD and does not trigger applicable requirements as a modification under NSPS or NESIAP.

#### SUMMARY

The modification described in this letter does not constitute a Title I modification and does not exceed a permitted, allowable emission rate. This modification does not violate applicable requirements or contravene federally enforceable permit terms and conditions that are monitoring, recordkeeping, reporting, or compliance certification requirements. Further, GP understands that a permit shield will not be extended to this modification.

GP appreciates your prompt review of the proposed 502(b)(10) change described in this letter and respectfully requests your written concurrence with the permitting conclusions

discussed herein. Please do not hesitate to contact Maria Zufall at 404.652.7256 or Forrest Denney at 404.652.4831 to discuss any questions and comments or if any additional information is required.

**CERTIFICATION**

*The undersigned certifies under the penalty of law, that all information and statements provided in this request, based on information and belief formed after reasonable inquiry, are true, accurate, and complete.*

Sincerely,

A handwritten signature in black ink, appearing to read "Mark Robinson", with a long, sweeping horizontal stroke at the end.

Mark Robinson  
Plant Manager

cc: Mr. Forrest Denney

Attachment

**ATTACHMENT**

**Emission Calculations**

Georgia Pacific Wood Products LLC  
Columbia, MS

Emissions Summary

	PM (tpy)	PM <sub>10</sub> (tpy)	PM <sub>2.5</sub> (tpy)	NO <sub>x</sub> (tpy)	CO (tpy)	VOC (tpy)	SO <sub>2</sub> (tpy)
<b>Kiln 2 and 3</b>							
A. Baseline	34.0	34.0	34.0	19.9	83.6	211.6	3.0
B. Capable of Accommodating	41.3	41.3	41.3	24.2	101.6	257.1	3.6
C. Projected Actual	44.8	44.8	44.8	26.3	110.3	279.2	3.9
D. Demand Growth (D = B - A)	7.3	7.3	7.3	4.3	18.0	45.5	0.6
E. Emission Increase (E = C - A - D)	3.5	3.5	3.5	2.1	8.7	22.0	0.3
<b>Affected Sources - Incremental Increase</b>							
Planer Mill Cyclone	0.8	0.8	0.8				
Shavings Truck Bin Cyclone	7.5E-03	7.5E-03	7.5E-03				
Fuel Bin Cyclone	0.2	0.2	0.2				
Deck Saw	4.3E-02	1.5E-02	1.5E-02				
Debarkers	0.5	0.2	0.2				
Hark Hog	5.1E-02	2.3E-02	2.3E-02				
Lillypad Chipper	4.9E-03	2.3E-03	2.3E-03				
Green Chipper	3.4E-02	1.5E-02	1.5E-02				
Shaker Screen	0.2	0.1	0.1				
Drop Points	2.4E-02	1.1E-02	1.7E-03				
Roads	6.5	1.8	0.2				
<b>Project Increase</b>	11.8	6.8	5.1	2.1	8.7	22.0	0.3
<b>PSD SER</b>	<b>25</b>	<b>15</b>	<b>10</b>	<b>40</b>	<b>100</b>	<b>40</b>	<b>40</b>
<b>Exceeds?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>
<b>MDEQ De Minimis</b>	<b>18.8</b>	<b>11.3</b>	<b>7.5</b>	<b>30.0</b>	<b>75.0</b>	<b>30.0</b>	<b>30.0</b>
<b>Exceeds?</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>	<b>No</b>

1. For sources without PM<sub>2.5</sub> data, it is assumed equal to PM<sub>10</sub>. For sources without PM<sub>10</sub> data, assumed equal to PM.

Georgia Pacific Wood Products LLC  
Columbia, MS

Project Details

Production ratio due to project	1.09
Kiln 2 and 3 Capable of Accommodating	105,816 Mbf/yr
Kiln 2 and 3 Future Actual	114,886 Mbf/yr
Increased Production	9,070 Mbf/yr

1. Production ratio calculated based on decrease in cycle time for the kilns. Equal to current average cycle time of 19 hours divided by future average cycle time of 17.5 hours.
2. Kiln 2 and 3 capable of accommodating calculated from highest production month during baseline period (March 2004).
3. Kiln future actual based on highest production month during baseline period and percent increase due to reduction in kiln cycle time. Value is consistent with a the combined kiln permit limit 160,000 Mbf/yr limit and with 70% of capacity for Kilns 2 and 3.

Production Data

Parameter	Units	2004	2005	2004-2005 Average	Parameter per Mbf	Increase Due to Project	Potential	Reference
Logs	tpy	576,387	534,045	555,216	4.48	40,634	1,735,487	1, 2
Bark generated	tpy	58,864	54,540	56,702	0.46	4,150	173,549	1, 3
Lily pads	tpy	5,835	5,406	5,621	4.54E-02	411	17,355	1, 4
Sawdust generated	tpy	1,225	1,135	1,180	0.01	86	112,128	1, 2
Chips generated	tpy	197,906	186,779	192,343	1.55	14,077	627,216	1, 2
Kiln Production - All	Mbf/year	135,159	112,701	123,930	1.00	9,070	160,000	1, 5
Kiln Production - 2&3 Only	Mbf/year	90,431	81,740	87,086	0.70	6,373		1
Dry Shavings Generated	tpy	5,852	4,402	5,127	0.04	375	36,704	1, 2
Fuel Silo Throughput	tpy	17,078	18,298	17,688	0.14	1,295		1
Planer Hours	hours	5,219	5,197	5,208	0.04	381	8,760	1
Truck Bin Hours	hours	1,923	1,008	1,466	0.01	107	8,760	1
Fuel Storage Hours	hours	3,296	4,189	3,743	0.03	274	8,760	1
Finished Lumber Trucks	No./year	3,490	4,521	4,006	0.03	293		1
1" Rough Green Lumber Trucks	No./year	366	404	385	3.11E-03	28		1
Block Trucks	No./year	145	125	135	1.09E-03	10		1

1. Actual throughput data per annual emission inventories and monthly kiln data.  
Increase due to project calculated based on past actual ratio of each parameter to Mbf and increase in Mbf due to project.
2. Potential throughput per 2008 Title V application. Calculated from ratio of maximum to actual board processing and actual process throughput for 2007.
3. Potential estimated as 10% of log throughput.
4. Potential estimated as 1% of log throughput.
5. Potential throughput per Title V permit limit, Condition 3.B.3

Georgia Pacific Wood Products LLC  
Columbia, MS

**Production Data**

Parameter	Past Actual	Increase in hours due to project
Planer Hours	5,208	381
Truck Bin Hours	1,466	107
Fuel Storage Hours	3,743	274

**Planer Mill Cyclone Test Data**

Test Date	PM Test Value (lb/hr)
October 2, 2003	3.14
January 30, 2006	3.68
October 11, 2007	2.65
Average + 2 Std. Deviations	4.19

**Cyclone Emissions**

Unit	ID	Past Actual PM Emission Factor (lb/hr)	Future PM Emission Factor (lb/hr)	Past Actual Emissions (tpy)	Emission Increase (tpy)
Planer Mill Cyclone	AA-001	3.14	4.19	8.2	0.8
Shavings Truck Bin Cyclone	AA-002	0.14	0.14	0.1	0.01
Fuel Bin Cyclone	AA-003	1.62	1.62	3.0	0.2

- Emission factors are based on test data. PM is assumed equal to PM<sub>10</sub> and PM<sub>2.5</sub>.  
 Past actual planer mill cyclone test data based test data for 2003, as this value would be used for 2004-05 emissions.  
 Increase emissin factor based on average plus 2 standard deviations of test data.  
 Shavings truck bin cyclone test data from September 30, 2003.  
 Fuel bin cyclone test data from September 30, 2003.
- Emissions calculated from lb/hr and hours per year.

Georgia Pacific Wood Products LLC  
Columbia, MS

**Production Data (Kiln 2 and 3 only)**

Parameter	Past Actual	Future Actual	Capable of Accommodating
Kiln Throughput (Mbf/yr)	87,086	114,886	105,816
Heat Input (MMBtu/yr)	239,486	315,937	290,994

1. Heat input estimated from 2.75 MMBtu/Mbf
2. Capable of accommodating equal to maximum month (March 2004 ) annualized to one year.

**Criteria Pollutant Emission Calculations**

Pollutant	Emission Factors (lb/MMBtu) (lb/mbf)		Past Actual Emission Rates <sup>1</sup> (tpy)	Future Actual Emission Rates <sup>1</sup> (tpy)	Capable of Accommodating (tpy)
PM(f+C) <sup>2</sup>	-	0.78	34.0	44.8	41.3
NO <sub>x</sub> <sup>3</sup>	-	0.458	19.9	26.3	24.2
SO <sub>2</sub> <sup>4</sup>	0.025	-	3.0	3.9	3.6
CO <sup>5</sup>	-	1.92	83.6	110.3	101.6
VOC <sup>6</sup>	-	4.86	211.6	279.2	257.1

1. For SO<sub>2</sub>:  

$$\text{Emission Rates (lb/hr)} = \text{Emission Factor (lb/MMBtu)} * \text{Fuel Usage (ton/yr)} * \text{Fuel Heat Content (Btu/lb)} / \text{Hours of Operation (hr/yr)} * (2,000 \text{ lb/ton}) * (\text{MMBtu}/10^6 \text{ Btu})$$

$$\text{Emission Rates (tpy)} = \text{Emission Factor (lb/MMBtu)} * \text{Fuel Usage (ton/yr)} * \text{Fuel Heat Content (Btu/lb)} * (\text{MMBtu}/10^6 \text{ Btu})$$
- For all other pollutants:  

$$\text{Emission Rates (lb/hr)} = \text{Emission Factor (lb/mbf)} * \text{Production Rate (mbf/yr)} / \text{Hours of Operation (hr/yr)}$$

$$\text{Emission Rates (tpy)} = \text{Emission Factor (lb/mbf)} * \text{Production Rate (mbf/yr)} * (\text{ton}/2,000 \text{ lb})$$
2. Georgia Pacific Title V Factors, average plus 2 standard deviations. Includes filterable and condensable.
3. Stack test data for similar facility (Idabel, 1996) plus 20% safety factor.
4. Emission factors from AP-42 Section 1.6 Wood Residue Combustion in Boilers (9/2003).
5. Georgia Pacific Title V Factors, average plus 2 standard deviations.
6. Calculated from the wood products protocol method plus a 20% safety factor.



Georgia Pacific Wood Products LLC  
Columbia, MS

Log and Saw Parameters

Log Length	40	ft/log
Log Diameter	0.92	ft
Density	58	lb/ft <sup>3</sup>
Saw Kerf Width	0.504	inches
No. Cuts per log	2	cuts/log

Deck Saw Emissions (F-001)

	Log Throughput (tpy)	Log Length <sup>1</sup> (feet/yr)	No. Logs <sup>2</sup>	Sawdust <sup>3</sup> (tpy)	Emission Factor (lb/ton) <sup>4</sup>		PM Emissions <sup>5</sup> (tpy)	PM <sub>10</sub> Emissions <sup>5</sup> (tpy)
					PM	PM <sub>10</sub>		
Past Actual	555,216	29,010,233	725,256	1,166	1.0	0.36	0.58	0.21
Increase	40,634	2,123,146	53,079	85	1.0	0.36	0.04	0.02

1. Log length calculated from log throughput (tpy) / density (lb/ft<sup>3</sup>) / area (ft<sup>2</sup>) \* 2000 lb/ton.
2. Number of logs calculated from total log length (ft/yr) / individual log length (ft).
3. Sawdust calculated from No. logs per year \* No. cuts (cuts/log) \* log area (ft<sup>2</sup>) \* kerf width (ft) \* density (lb/ft<sup>3</sup>) / 2000.
4. Emission factor based on the FIRE database for SCC 3-07-008-03 for sawdust storage pile handling.  
Emissions assumed similar since sawing is creating sawdust.
5. Annual emissions calculated from emission factor (lb/ton) \* sawdust (tpy) / 2000 (lb/ton).

Debarker, Hog, and Chipper Emission Calculations (FS-002, FS-003, FS-004, FS-005)

Unit	Throughput		PM Emissions		PM <sub>10</sub> Emissions	
	Past Actual (tpy)	Increase (tpy)	Past Actual (tpy)	Increase (tpy)	Past Actual (tpy)	Increase (tpy)
F-002 Debarkers	555,216	40,634	6.66	0.5	3.05	0.22
F-003 Bark Hog	57,882	4,236	0.69	0.05	0.32	0.02
F-004 Lillypad Chipper	5,621	411	6.74E-02	4.94E-03	3.09E-02	2.26E-03
F-005 Green Chipper	38,469	2,815	0.46	0.03	0.21	0.02
IS - Shaker Screen	193,523	14,163	2.32	0.17	1.06	0.08

1. Debarker throughput based on total logs. Bark Hog throughput based and bark plus sawdust.  
Lillypad Chipper throughput based on lillypad throughput (0.1% of logs). Green chipper throughput based on 20% of chip production.  
Shaker screen throughput equal to chips plus sawdust.
2. Emission factor per FIRE database, SCC Code 3-07-008-01, Log Debarking.  
PM 0.024 lb/ton of logs processed  
PM<sub>10</sub> 0.011 lb/ton of logs processed

Georgia Pacific Wood Products LLC  
Columbia, MS

Emission Factor Calculation

Material	Moisture Content <sup>1</sup>	Emission Factor (lb/ton) <sup>2,3</sup>		
		PM	PM <sub>10</sub>	PM <sub>2.5</sub>
All	4.8	1.19E-03	5.63E-04	8.52E-05

1. Moisture content (M) for f set equal to the maximum value for which the equation is appropriate. Actual moisture content is higher.

2. Emission factor calculated from where:

$$E \text{ (lb/ton)} = k \times 0.0032 \times \frac{\left(\frac{U}{5}\right)^{1.3}}{\left(\frac{M}{2}\right)^{1.4}}$$

- k: Particle size multiplier

0.74 PM

0.35 PM<sub>10</sub>

0.053 PM<sub>2.5</sub>

U: Mean wind speed 7.558 mph

3. Emission factor per AP-42, Section 13.2.4, *Aggregate Handling and Storage Piles*, drop equation. Mean wind speed for Baton Rouge, LA per EPA TANKS meteorological database.

Emissions Calculation

Material	No. Drop Points	Throughput (tpy)		PM Emissions (tpy)		PM <sub>10</sub> Emissions (tpy)		PM <sub>2.5</sub> Emissions (tpy)	
		Past	Increase	Past	Increase	Past	Increase	Past	Increase
Sawdust/Bark Bin	2	57,882	4,236	6.88E-02	5.04E-03	3.26E-02	2.38E-03	4.93E-03	3.61E-04
Green Chip Loading	2	192,343	14,077	2.29E-01	1.67E-02	1.08E-01	7.92E-03	1.64E-02	1.20E-03
Dry Shavings Loading	2	5,127	375	6.10E-03	4.46E-04	2.88E-03	2.11E-04	4.37E-04	3.20E-05
Fuel Silo Loading	2	17,688	1,295	2.10E-02	1.54E-03	9.95E-03	7.28E-04	1.51E-03	1.10E-04
<b>Total</b>				0.32	0.02	0.15	0.01	0.02	1.70E-03

Georgia Pacific Wood Products LLC  
Columbia, MS

Road Emissions (F-006)

Average Through Traffic:	Past Actual	Increase	Units
<b>Shavings Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.8	0.8	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	5,127	375	tons/yr
Total number of trucks:	182	14	trucks/yr
Vehicle miles traveled (VMT):	145	11	miles/yr
<b>Chip Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.8	0.8	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	192,343	14,077	tons/yr
Total number of trucks:	6,821	521	trucks/yr
Vehicle miles traveled (VMT):	5,457	417	miles/yr
<b>Log Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.7	0.7	miles/trip
Unloaded vehicle weight:	13.6	13.6	tons/truck
Loaded vehicle weight, (approx.):	42	42	tons/truck
Material Throughput	555,216	40,634	tons/yr
Total number of trucks:	19,550	1,431	trucks/yr
Vehicle miles traveled (VMT):	13,685	1,002	miles/yr
<b>Bark /Sawdust Fuel Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	1.0	1.0	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	41.5	41.5	tons/truck
Material Throughput	57,882	4,236	tons/yr
Total number of trucks:	2,053	157	trucks/yr
Vehicle miles traveled (VMT):	2,053	157	miles/yr
<b>Finished Lumber Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	15	15	tons/truck
Loaded vehicle weight, (approx.):	35	35	tons/truck
Total number of trucks:	4,006	293	trucks/yr
Vehicle miles traveled (VMT):	2,403	176	miles/yr
<b>1" Rough Green Lumber (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	40	40	tons/truck
Total number of trucks:	385	28	trucks/yr
Vehicle miles traveled (VMT):	231	17	miles/yr
<b>Block Trucks (Unpaved Road)</b>			
# roundtrips per truck:	1	1	trips/truck
# miles per roundtrip:	0.6	0.6	miles/trip
Unloaded vehicle weight:	13.3	14.5	tons/truck
Loaded vehicle weight, (approx.):	40	40	tons/truck
Total number of trucks:	135	10	trucks/yr
Vehicle miles traveled (VMT):	81	6	miles/yr

1. Total number of trucks calculated from material throughput divided by difference between unloaded and loaded weight.  
For finished lumber, rough green lumber and block trucks, total trucks were based on 2004/2005 data and future increase.  
2. Vehicle miles traveled (VMT) = Total # of trucks \* # miles per roundtrip

Average Fleet Weight                      27.38                      27.58

# Emission Calculations

Pollutant	Emission Factor (lb/VMT)		VMT		Emissions (tpy)	
	Past Actual	Increase	Past Actual	Increase	Past Actual	Increase
TSP	7.21	7.24	24,055	1,785	86.76	6.46
PM <sub>10</sub>	2.06	2.06	24,055	1,785	24.73	1.84
PM <sub>2.5</sub>	0.21	0.21	24,055	1,785	2.47	0.18

Calculated from:

$$\text{lb PM} = k * (\text{silt}\% / 12)^{1/4} * (\text{Wt.3})^{0.45} * (365 - \text{rain days}) / 365$$

$$\text{lb PM}_{10} / \text{PM}_{2.5} = k * (\text{silt}\% / 12)^{1/4} * (\text{Wt.3})^{0.45} * (365 - \text{rain days}) / 365$$

(Emission factors are based on the average of the loaded and unloaded lb/VMT factors)

where:  $k_{\text{to TSP}} = 4.9$  (See AP-42, Table 13.2.2-2)

$k_{\text{to PM}_{10}} = 1.5$  (See AP-42, Table 13.2.2-2)

$k_{\text{to PM}_{2.5}} = 0.15$  (See AP-42, Table 13.2.2-2)

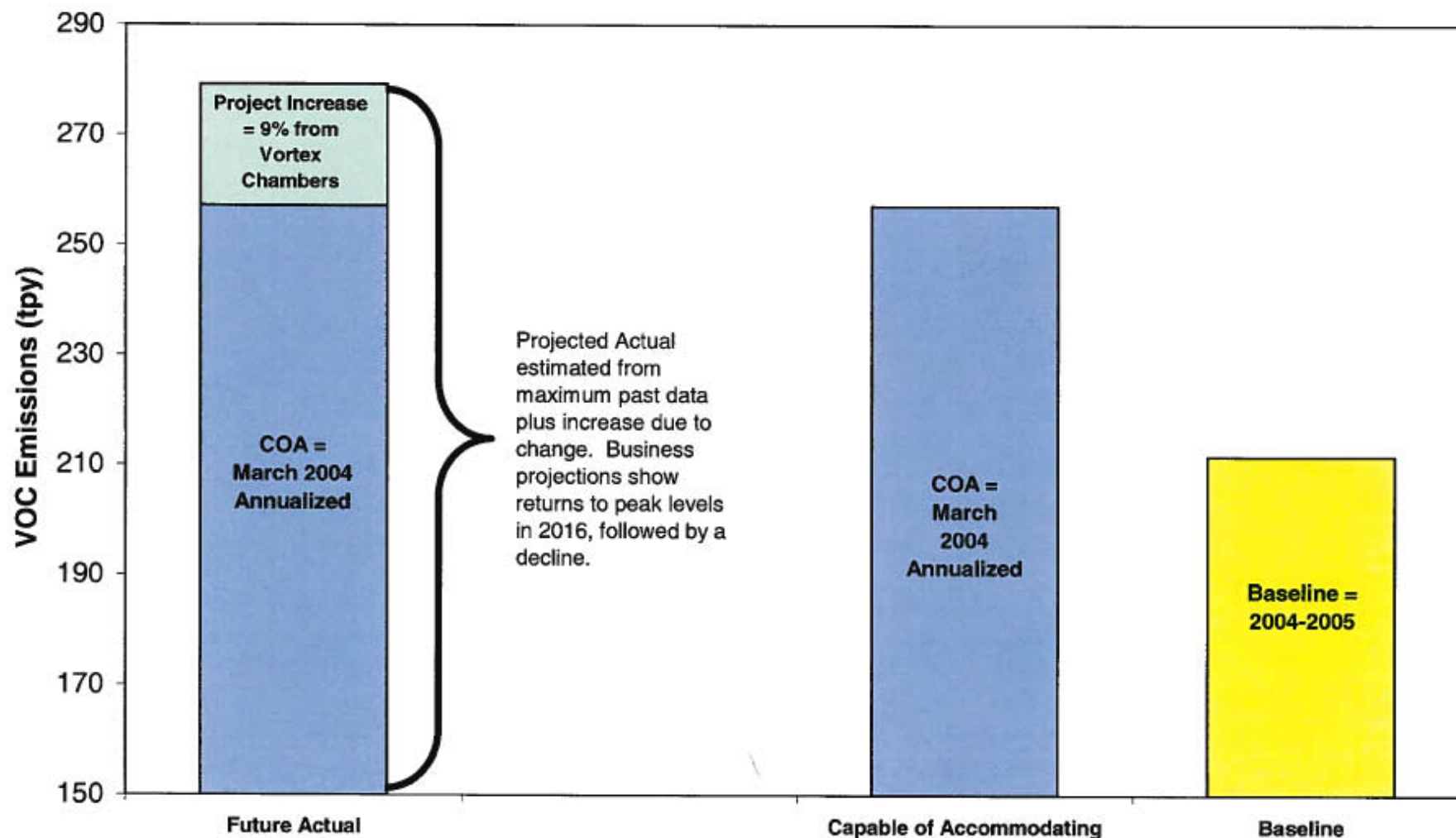
% Silt: 8.4 (See AP-42, Table 13.2.2-1)

Operating Days: 365

Average # Rainy Days: 110 (See AP-42, Figure 13.2.2-1)

Wt is the average fleet weight

### Example VOC Emissions for Kiln 2 and 3



\*9% increase based on Kiln 3 modification (March 2009) which showed a potential for kiln batch times to decrease from 19 to 17.5 hours

## **Attachment E**

### **Application Forms**



Utah Division of Air Quality  
New Source Review Section

Date 12/21/11

Form 1  
Notice of Intent (NOI)

Application for: ☐ Initial Approval Order ☒ Approval Order Modification

APPROVAL ORDER MUST BE ISSUED BEFORE ANY CONSTRUCTION OR INSTALLATION CAN BEGIN. This is not a stand alone document; please refer to UAC R307-401 and the published NOI guidebook for information on requirements of the specified information below. Please print or type all information requested. All outlined information requested must be accurate and completed before DAQ can determine that an NOI is complete and an engineering review can be initiated. If you have any questions, contact the Division of Air Quality at (801) 536-4000 and ask to speak with a New Source Review Engineer. Written inquiries may be addressed to: Division of Air Quality, New Source Review Section, P.O. Box 144820, Salt Lake City, Utah 84114-4820.

General Owner and Facility Information		R307-401-5(2)(k)
1. Filing Fee Paid*	2. Application Fee Paid*	
3. Company name and address: Tesoro Refining and Marketing Company 474 West 900 North Salt Lake City, UT 84103  Phone No.: (801) 366-2036 Fax No.: (801) 521-4965	4. Company** contact for environmental matters: Matthew Buell  Phone no.: (801) 521-4966 Email: <i>** Company contact only; consultant or independent contractor contact information can be provided in a cover letter</i>	
5. Owners name and address: Tesoro Corporation 19100 Ridgewood Parkway San Antonio, TX 78259  Phone no.: Fax no.:	6. Property Universal Transverse Mercator coordinates (UTM), including System and Datum: Easting: 423,400  Northing: 4,515,950  System: UTM Zone 12  Datum:	
7. County where the facility is located in: Salt Lake	8. Standard Industrial Classification Code 2911	
9. Designation of facility in an attainment, maintenance, or nonattainment area(s):  SL City CO Maint Area SL Co Ozone Maint Area SL Co PM10 NAA SL Co PM2.5 NAA SL Co SO2 NAA		

10. If request for modification, AO# to be modified: DAQE#See Attached List		Date:
11. Identify any current Approval Order(s) for the facility <b>not</b> being modified with this request:		
AO#See Attached List	Date	
AO#	Date	
AO#	Date	
AO#	Date	
12. Application for:		
<input checked="" type="checkbox"/> New construction	<input checked="" type="checkbox"/> Modification	
<input type="checkbox"/> Existing equipment operating without permit	<input type="checkbox"/> Permanent site for Portable Approval Order	
<input checked="" type="checkbox"/> Change of permit condition	<input type="checkbox"/> Change of location	
13. Construction or modification estimated start date:5/1/12		Estimated completion date:10/1/13 R307-401-5(2)(h)
14. Does this application contain justifiable confidential data? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
15. Current Title V (Operating Permit) Identification:		Date
<input type="checkbox"/> Requesting an enhanced Title V permit with this AO modification		
16. Brief (50 words or less) description of project to post on DAQ web for public awareness The Project will add Black and Yellow Wax crude unloading facilities and include changes to the Crude Unit, Fluidized Catalytic Cracking Unit, and Distillate Desulfurization Unit. The changes will allow additional processing of waxy crudes and will improve product yields and increase production of light products.		
<b>Process Information</b>		
17. Appendix A: Detailed description of project including process flow diagram (Forms 2-23)		
<input checked="" type="checkbox"/> Fuels and their use	<input checked="" type="checkbox"/> Equipment used in process	<input checked="" type="checkbox"/> Description of product(s)
<input checked="" type="checkbox"/> Raw materials used	<input checked="" type="checkbox"/> Operation schedules	<input checked="" type="checkbox"/> Description of changes to process (if applicable)
<input checked="" type="checkbox"/> Production rates (including daily/seasonal variances)		R307-401-5(2)(a)
18. Appendix B: Site plan of facility with all emission points and elevations, building dimensions, stack parameters included		
R307-401-5(2)(e)		



### Emissions Information

19. Appendix C: Emission Calculations that must include:

- ☒ Emissions per new/modified unit for each of the following: PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>x</sub>, CO, VOC, and HAPs
- ☒ Designation of fugitive and non fugitive emissions
- ☒ Major GHG Sources: Emissions per new/modified unit for GHGs (in CO<sub>2</sub>e short tons per year)
- ☒ References/assumptions for each Emission Factor used in calculating Criteria pollutant, HAP, and GHG emissions
- ☒ HAP emissions (in pounds per hour and tons per year) broken out by specific pollutant and summed as a total

R307-401-5(2)(b)

20. Appendix D: DAQ Form 1a or equivalent (comparison of existing emissions to proposed emission and resulting new total emissions)

21. Appendix E: Source Size determination (Minor, Synthetic Minor, Major, or PSD)

- ☒ If an Existing Major Source: Determination of Minor, Major or PSD modification

22. Appendix F: Offset requirements (nonattainment/maintenance areas)

- ☐ Acquired required offsets

R307-401-420 & R307-401-421

### Air Pollution Control Equipment Information

23. Appendix G: Best Available Control Technology (BACT) analysis for the proposed source or modification

R307-401-5(2)(d)

24. Appendix H: Detailed information on all new/modified equipment controls. It is strongly recommended using DAQ forms as they outline required information, but something equivalent to the DAQ forms is acceptable.

R307-401-5(2)(c)

25. Appendix I: Discussion of Federal/State requirement applicability (NAAQS, SIP, NSPS, NESHAP, etc)

### Modeling Information

26. Appendix J: Emissions Impact Analysis (if applicable)

R307-410-4

### Electronic NOI

27. A complete and accurate electronic NOI submitted

R307-401-5(1)

I hereby certify that the information and data submitted in and with this application is completely true, accurate and complete, based on reasonable inquiry made by me and to the best of my knowledge and belief.

Signature:

Title:

Name (print)

Telephone Number:

Date:

*\*with the exception of Federal Agencies who will be billed at completion of the project*

Form 1 (NOI) Continued

4. Company Contact Email: [matthew.w.buell@tsocorp.com](mailto:matthew.w.buell@tsocorp.com)

10. Approval Orders to be modified:

DAQE-AN0103350051-11      Date: 8/25/11

DAQE-AN103350055-11      Date: 12/7/11

11. Current Approval Orders not being modified:

DAQE-0741-93

DAQE-0742-93

DAQE-AN0103350042-08



## Utah Division of Air Quality

# NOTICE OF INTENT COMPLETENESS CHECKLIST

TO BE COMPLETED BY PROJECT ENGINEER WITHIN 30 DAYS OF RECEIPT OF THE NOTICE OF INTENT (NOI). CRITERIA DERIVED FROM R307-401-5, UTAH ADMINISTRATIVE CODE (UAC). ANY NEGATIVE RESPONSE WILL CAUSE APPLICATION TO BE DELAYED. ALL REFERENCES ARE TO THE UAC EXCEPT AS NOTED.

Project Name:

Date:

- 
1. Fees Paid
    - A. Filing Fee Cover letter Y ☐ N ☐
    - B. Application Fee Y ☐ N ☐
  2. Source Identification Information: [R307-401-5(2)(k)]
    - A. Name, address, and telephone number (w/area code) Y ☐ N ☐
    - B. Company submitting application Y ☐ N ☐
    - C. Plant manager and/or Company contact Y ☐ N ☐
    - D. Plant (if different from Company) Y ☐ N ☐ N/A ☐
    - E. Company owner and agent Form 1 Y ☐ N ☐
    - F. Property UTM coordinates General information in Sections 1.0 and 2.1 Y ☐ N ☐
    - G. County where facility is located Y ☐ N ☐
    - H. SIC Code(s) Y ☐ N ☐
    - I. Facility area designation (attainment, maintenance, or nonattainment) Y ☐ N ☐
  3. If modification, AO# to be modified [R307-401-5(2)(k)] Form 1  
Sections 1.0 and 4.13 Y ☐ N ☐ N/A ☐
    - A. Other current Approval Order(s) for facility not being modified Y ☐ N ☐ N/A ☐
    - B. Current Title V (Operating Permit) Form 1  
Section 1.0 Y ☐ N ☐ N/A ☐
  4. Purpose of application [R307-401-5(2)(a)] Form 1  
Section 2.4 Y ☐ N ☐
  5. Construction schedule [R307-401-5(2)(h)] Form 1  
Section 2.4 Y ☐ N ☐ N/A ☐
  6. Justifiable confidential data N/A Y ☐ N ☐ N/A ☐
  7. Description of Source Process. [R307-401-5(2)]
    - A. Detailed description of project: [(Appendix A) (Forms 2-23)]
      1. Fuels and their use Y ☐ N ☐
      2. Raw materials used Y ☐ N ☐ N/A ☐
      3. Description of product(s) Section 2.0 and sub-sections Y ☐ N ☐
      4. Equipment used in process Y ☐ N ☐
      5. Operation schedules Y ☐ N ☐
      6. Description of changes to process Y ☐ N ☐ N/A ☐
      7. Production rates Y ☐ N ☐ N/A ☐

- B. Site plan of facility with, building dimensions, stack parameters included: Y ☐ N ☐  
 (Appendix B)  
 1. Emission points and elevations Attachment A Y ☐ N ☐  
 2. Building dimensions No stack parameters included Y ☐ N ☐ N/A ☐  
 3. Stack parameters (no modeling analysis) Y ☐ N ☐ N/A ☐

8. Emissions Related Information. [R307-401-(2)(b)]

- A. Emission Calculations: (Appendix C)  
 1. Emissions per new/modified unit for all pollutants: Sections 3.0, 3.4, and Y ☐ N ☐  
 (PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub>, SO<sub>x</sub>, CO, VOC, and HAPs) Attachment B  
 2. Designation of fugitive and non-fugitive emissions Y ☐ N ☐  
 3. Major GHG Sources: (in CO<sub>2</sub>e short tons per year) Y ☐ N ☐ N/A ☐  
 4. References/assumptions for each calculation and pollutant Y ☐ N ☐  
 5. HAP emissions (broken out by specific pollutant in pounds per hr) Y ☐ N ☐ N/A ☐  
 6. Applicable Material Safety Data Sheets Y ☐ N ☐  
 B. DAQ Form 1a or equivalent (Appendix D) Attachment B Y ☐ N ☐  
 C. Source size determination (Appendix E) Section 3.0 and sub-sections  
 1. If Existing Major Source: Determination of Minor, Major, or PSD Y ☐ N ☐ N/A ☐  
 Modification  
 D. Offset requirements (nonattainment/maintenance areas) Sections 4.10, 4.11 Y ☐ N ☐ N/A ☐  
 [(R307-401-420)(R307-401-421)] (Appendix F) (not applicable)  
 1. Acquired required offsets Y ☐ N ☐ N/A ☐

9. Air Pollution Control Equipment Section 4.5.1

- A. Best Available Control Technology (BACT) Analysis Y ☐ N ☐  
 [R307-401-5(2)(d), (Appendix G)]  
 B. Detailed information on new/modified equipment controls [R307- Y ☐ N ☐  
 401-5(2)(c), (Appendix H)]

10. Federal/State requirement applicability [(NAAQS, SIP, NSPS, etc), (Appendix I)] Y ☐ N ☐ N/A ☐

11. Modeling information

Section 4.0 and sub-sections

- A. Emissions Impact Analysis [(R307-410-4), (Appendix J)] Not Applicable Y ☐ N ☐ N/A ☐

12. Signature on application (Form 1 Notice of Intent) Form 1 Y ☐ N ☐